

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXV: No. 10.

New York, Thursday, March 4, 1880.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Notes on the Blast Furnace.*

BY J. M. HARTMAN.

One of the most important subjects to the blast furnace engineer is a thorough knowledge of the conditions affecting the temperature in the different portions of the furnace. All efforts to decrease the consumption of fuel and improve the working of the furnace must be based upon it, and I may, therefore, be permitted to place before you the results of my observations and detail the conclusions to which they have led me.

At the bottom of a blast furnace making No. 3 iron a temperature of about 2900 degrees exists, and passing upward the temperature increases slightly to a point just below the tuyeres, where it is lowered, because the blast enters at a temperature lower than that prevailing in the interior. A short distance above the tuyeres the oxy-

gen of the gas, and, therefore, an increase of temperature is the result. Further down a zone is reached where a temperature of 750 degrees prevails. It is here that the limestone begins to part with its carbonic acid, if pure calcite is used, while dolomitic limestone requires a higher temperature before its carbonic acid can be expelled. From this zone downward the heat increases until the iron and cinder begin to melt, a process during which the latent heat necessary to accomplish fusion is absorbed. From the lower limits of this region down to a point about 3 feet above the tuyeres, the atmosphere of pure carbonic oxide protects the shots of falling iron from burning, and reduces any fugitive pieces of ore escaping the zone of fusion. From about 3 feet above the tuyere to about 6 inches below them, an atmosphere of mostly carbonic acid exists. This space is called the zone of combustion, and it is upon the extent of this region that the rapidity of the driving of the furnace or the volume of entering blast depends.

The specific heat of ore and stone is twice that of coal. Running on a burden of one pound of coal to one pound of ore, more heat is developed than is required. The descending stock cannot absorb the large volume of heat coming up, and consequently the furnace becomes hot to the top. This excess of heat is partly absorbed by the decomposition of some of the carbonic acid in the gas by the glowing coal at the top, carbonic oxide being formed. As this amount of coal is lost to the furnace, it is wasted. This waste, however, acts advantageously, by causing less coal to reach the hearth, and thus hindering the make of iron high in silicon. This evil exists more widely than is generally supposed, as it is, to a certain extent, self-corrective. If the burden is increased, say two pounds of ore to one of coal, and the same volume of blast used, then the heat returned per hour to the hearth from the ore and stone will be double. This heat, in combination with a higher temperature of the blast, replaces the

from the wear of stock. This line between the smooth and rough surface marks the limit of the zone of fusion, and its height is determined by the volume of air entering the furnace per minute. The number of cubic feet of air entering per minute, divided by five, will give the cubic contents of the zone from the top of fusion limit down to the tuyeres, for charcoal; dividing it by four will give it for coke, and dividing by three will give it for anthracite. These figures have been determined by measuring the area spoken of and comparing it with the air entering per minute in a number of furnaces, and, for all practical purposes, it will be found correct.

Mr. Dan. Morgan, founder of the Pennsylvania Iron Company, wishing to determine the height of the melting point in the furnace, took four bars of 1½-inch square iron, placed them on different points and lowered them through his open-top furnace until the bottom ends ought to have reached the tuyeres. After they were in one month

bosh is 63 feet, while the circumference of this furnace at the fusion limit is about 44 feet. The stock immediately on the bosh and sliding down as a whole is about 30 inches thick, while the balance of the stock in the central portion travels independently and much more rapidly. A compression or squeezing together of 63-44=19 feet has to take place in the stock traveling down the slope of the bosh. If the stock is pasty it squeezes together and jams, as above described. This ring or "skew-back" lodges the stock above it up to the top of the furnace (see Fig. 4 page 3). The stock descending through the middle of the furnace by its side thrust retains this lodged stock in a vertical position, making a dry wall of it. This cuts off the reducing area of the furnace and proves Cochrane's law—that the yield of a furnace shows its working area. When this lodgment or scaffold occurs, the lodged part collects heat at the bottom, which accumulates and works up to the top of the furnace. The stock against the walls under

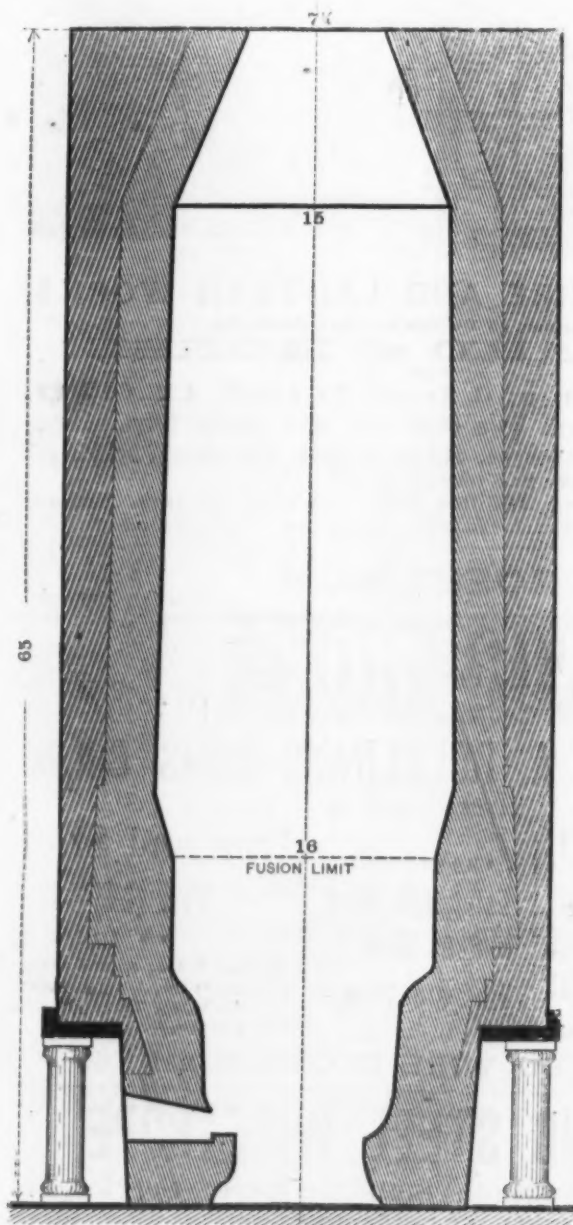


Fig. 2.—Shape of Furnace after Six Months' Operation.

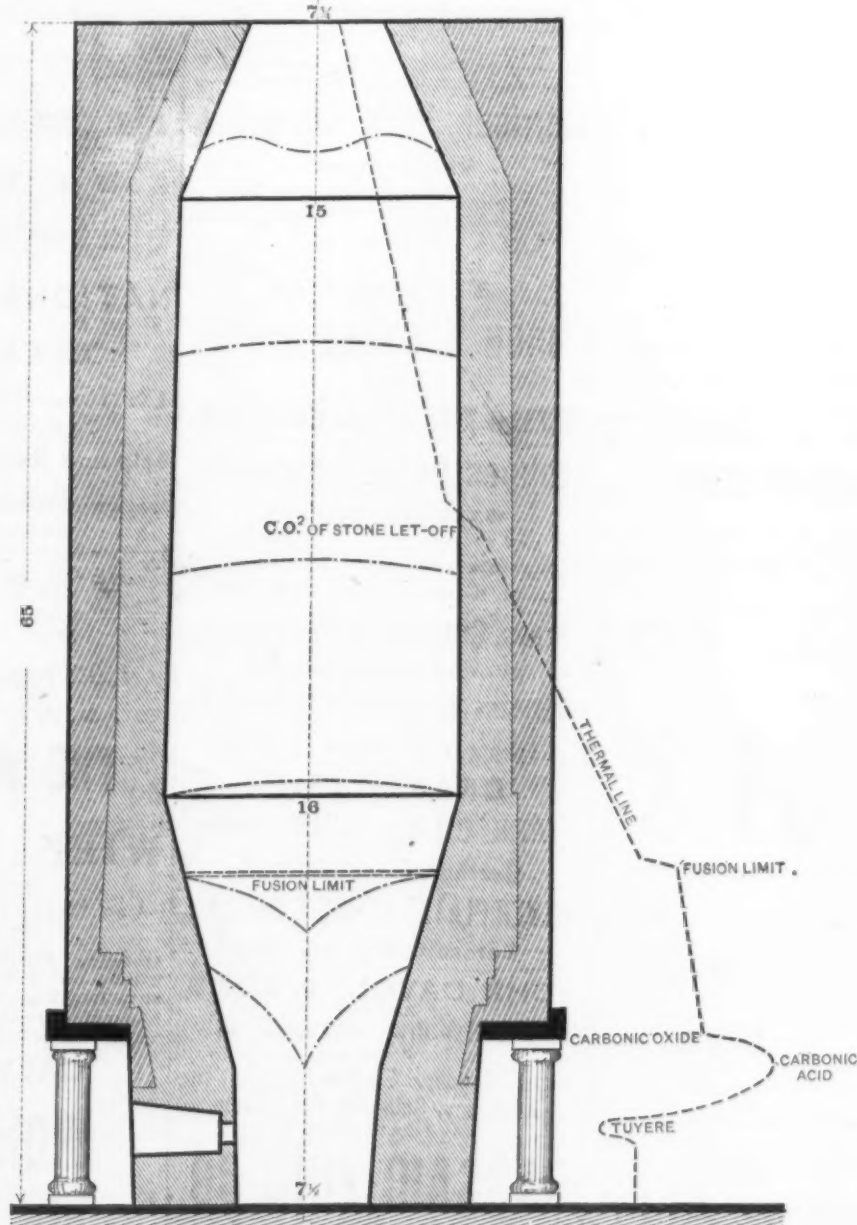


Fig. 1.—Descent of Stock and Thermal Line.

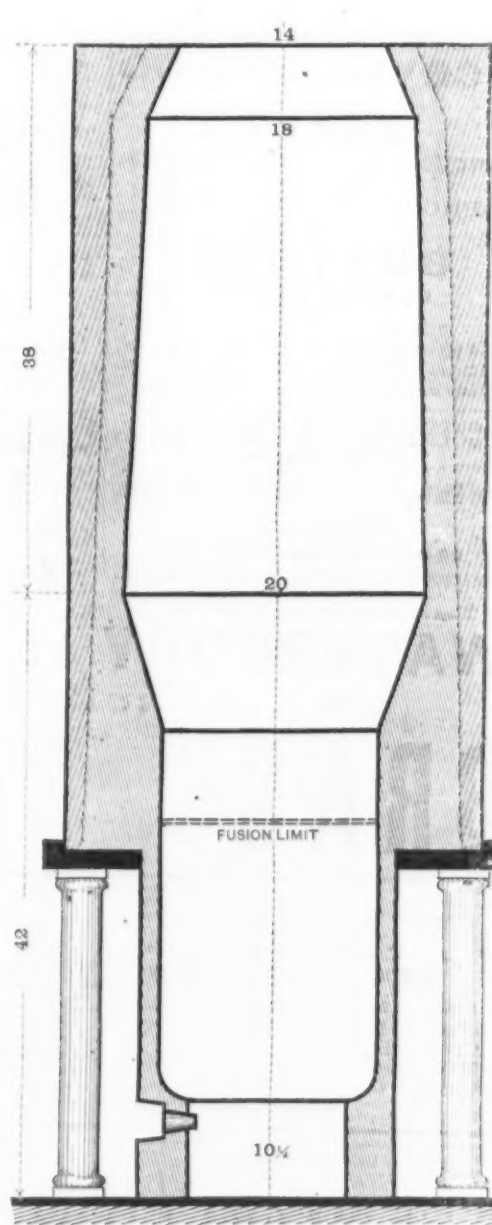


Fig. 3.—Proposed Form of Furnace.

BLAST FURNACE LINES AS AFFECTED BY THE WORKING.

gen of the blast has been consumed in the formation of carbonic acid, and then the intensity of combustion is greatest. The carbonic acid, in ascending, is immediately converted to carbonic oxide by the action of glowing coal present on all sides.

This process absorbs heat and lowers the temperature, giving at the same time a powerful reducing atmosphere. Passing upward the heat gradually decreases, until at a certain point it suddenly falls off, because liquefaction of the ore, stone and iron absorbs heat. From this zone upward, the temperature decreases until the region is reached where the carbonic acid in the limestone is expelled, a process which leads to further absorption of heat. The decline of the temperature is continuous and uniform from this zone to the top, where the temperature is about 250 degrees when the furnace is working well. Graphically these variations may be expressed in the manner shown in Fig. 1.

A charge of coal, ore and stone descends about 3 feet per hour (if the furnace is driven properly), absorbing heat from the upward current of gas until it has reached a temperature of about 570 degrees, when the ores begin to part with their oxygen. The quantity of heat absorbed in decaying the ores is less than the heat developed by the union of the oxygen of the ores and carbonic oxide

From the hearth or bottom of the furnace to the zone of fusion the furnace is filled with glowing coal, although occasionally a stray piece of refractory ore or stone will be found below it.

When cold air is blown into a charcoal furnace the fire would go out, were it not that the fire already in the hearth imparts sufficient heat to the air and coal to keep up combustion. This, however, drains the hearth of its heat and impairs the intensity of combustion, a deficiency which has to be made up by the addition of more charcoal. The quantity or volume of heat is sufficient, but the intensity required to melt the iron and cinder can only be got by using extra fuel. If, however, air heated to 800 degrees is blown into the furnace, the charcoal will fire without the aid of further heat, and the drain of heat on a hearth using cold blast is avoided. For coke the blast must be heated to about 1000 degrees, while fully 1300 degrees is required for anthracite.

Concentration of heat at the tuyeres is one of the first aims for successful furnace work. This can only be obtained by large hearths, hot blast, heavy burden and rapid driving. The descending stock in the furnace collects the heat from the ascending gas and carries it down to the hearth again, increasing the intensity of combustion at that point, an important matter when it is considered that the intensity of combustion in the hearth determines the grade of iron.

pound of coal which it saves, and at the same time doubles the yield of iron.

The descent of stock in the furnace is governed entirely by the rapidity of combustion at the tuyeres. A true test of the furnace is the number of tons of material passing through in 24 hours, be it coal, ore and stone. If the volume is large the furnace is well proportioned, and the greater the proportion of ore in the total stock the larger will be the yield of iron.

The action of the blast furnace having been described, the form of furnaces will be considered. Taking a modern furnace (see Fig. 1) the descent of the stock will be represented by the curved dotted lines shown in Fig. 1. In the upper part the sides travel quicker than the center. From the bosh down the sides travel slower than the center. When a furnace of this shape has been in blast six months and it has been worked up to full capacity, it will assume the shape given in Fig. 2. Starting from the tuyeres we find, at a point about 3 feet above them, that the walls are cut back, and that from there upward they are nearly vertical, until a short distance above the mantel is reached, when the walls are again cut back. This latter cutting away is due to the fact that the thick walls above the mantel retain the heat and allow the brick to burn away. Continuing upward we arrive at a point where the rough, frosted surface of the walls suddenly disappear, and the walls are smooth

they were pulled out, and all of them found burned off exactly 7 feet 6 inches above the tuyeres. The ends were burned square off, showing that there was a sudden change of temperature at their ends. Some time after this the men at the 6 o'clock cast, struck and went home. As neither persuasion nor fair offers could induce the men to resume work, Mr. Morgan finally got some laboring men to clean out the furnace, which had by that time chilled. After shoveling out for some time through the tuyeres the coal stopped descending, and on examination it was found that a straight and well-defined ceiling extended across the bosh. As they could not get it down, they went to the top and took the stock out in buckets until they got down to what appeared to be a floor. After clearing this floor off, a hole was broken through it, which showed it to be 15 inches thick. This ceiling was 7 feet 6 inches up from the tuyeres, and corresponded to the height at which the rods were burned off. In this case the zone of fusion lost its heat and set firmly across the bosh.

If sufficient heat gets above the fusion limit of a blast furnace to paste the stock and yet not fuse it, this stock jams on the bosh, forming a ring which, if the stock above cannot push it down to the fusion limit, allows this ring to become permanently set and so obstruct the flow of stock. The circumference of a furnace of 20 feet

the bell becomes red hot, while the stock in the center is cold. This has led to the idea that a furnace sometimes works up her walls, while the reverse is the case. After a furnace has been in this condition for some time, the attrition of the stock and an increase of temperature sufficient to melt the skew-back causes the latter to give way, and the scaffold gradually slides downward in the furnace. While the furnace is melting up the scaffold it becomes extremely hot, because the work of reduction has been done thoroughly and carbon stored up in the scaffold. The founder in this case increases his burden and drives the furnace. As soon as this scaffold part is worked out the furnace turns on white iron, unless the founder has reserve heat in his hot blast. When a furnace in this scaffolded condition is blown down, the dry wall around the sides falls in and no trace of it can be found. When the founder gets the furnace blown down to the bosh and finds no scaffold, he re-fills; but in a short time the old trouble shows itself. From the foregoing explanations it will be seen that the difficulty is that he did not blow it down to this ring or skew-back. Furnaces built the usual shape, cut out so much above the tuyeres that the engine and hot blast are not large enough to handle this space, the blast, having so large a space to fill, shuffles about from side to side of the furnace, causing it to work hot first on one side and then on the other. As

* Read at the New York meeting of the American Institute of Mining Engineers.

Metals.

**ANSONIA
BRASS & COPPER CO.,**
No. 19 Cliff Street,
Phelps Building, NEW YORK.

BRASS AND COPPER
IN
Sheets, Bolts, Rods, Wire, &c.
**Seamless Brass & Copper
Tubing.**

Ansonia Corrugated Stove Platforms.
PURE COPPER WIRE
For Electrical Purposes, Bare and Covered.
Phosphor Bronze Rods for Pumps, &c.

**ANSONIA ★ REFINED
INCOT COPPER.**

PHELPS, DODGE & CO.

IMPORTERS OF
**TIN PLATE,
ROOFING PLATE,**

Sheet Iron, Copper, Pig Tin, Wire,
Zinc, &c.

MANUFACTURERS OF
COPPER AND BRASS.
CLIFF STREET, NEW YORK.

SCOVILL MFG CO
**BRASS,
HINGES, WIRE, GERMAN SILVER.**

PHOTOGRAPHIC GOODS.

**BUTTONS,
CLOTH AND METAL.**

DEPOTS: FACTORIES:
418 & 421 Broome St., N. Y. Waterbury, Conn.
177 Devonshire St., Boston. New Haven, Conn.
193 Lake St., Chicago. New York City.

DICKERSON, VAN DUSEN & CO.,
Importers of
Tin Plate, Pig Tin, Sheet Iron, Copper,
Wire, Zinc, Etc.
29 & 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

Established 1837. Incorporated 1874.
WATERBURY MFG. CO.,
WATERBURY, CONN.

BRASS GOODS.

N. & C. TAYLOR CO.,
Philadelphia.

ESTABLISHED 1810.

TIN PLATES.
A specialty for sizes used in the manufacture of
Cheese Vats,
Cream Pans,
Milk Cans,
Cotton Cans, &c.

Manufacturers,
Importers and Dealers,
Wholesale and Retail,
in all kinds of

N. & C. TAYLOR CO.

Can make any size
Sheet Tin, Roofing Tin,
Sheet Zinc, Sheet Iron,
Sheet Copper, Sheet Brass,
Sheet Lead.

Send for our special prices and list of sizes.

ABRAHAM S. HEWITT, President.
WM. HEWITT, Vice President.
**THE
TRENTON IRON COMPANY,**
(Incorporated 1847).
TRENTON, NEW JERSEY,
MANUFACTURERS OF

IRON and STEEL WIRE

OF ALL GRADES,

BRIGHT, ANNEALED, COPPERED, TINNED AND GALVANIZED;
Iron and Steel Wire Rods;

EXTRA QUALITIES OF BAR IRON AND RODS.

Best Qualities of Gun-Screw and Charcoal Iron Wire;
Crucible, Siemens-Martin and Bessemer Steel Wire.

Wire Straightened and Cut to Lengths.

Represented in New York by COOPER, HEWITT & CO., 17 Burling Slip.

BRODERICK & BASCOM,

MANUFACTURERS OF

**IRON STEEL
WIRE ROPE. WIRE ROPE.**

800 N. Main St.,

Metals.

Waterbury Brass Co.

CAPITAL - \$400,000.

Sheet, Roll and Platers' Brass,

GERMAN SILVER,

Copper, Brass and German Silver Wire,

BRASS AND COPPER TUBING.

COPPER RIVETS & BURS,

BRASS KETTLES,

Door Rail, Brass Tags,

PERCUSSION CAPS,

POWDER FLASKS.

Metallic Eyelets, Shot Pouches, Tape Measures, &c.

And small Brass Wares of every Description.

Cartridge Metal in Sheets or Shells a Specialty.

Sole Agents for the

Capewell Mfg. Co.'s Line of Sport-

ing Goods and Wood's Paper

Shot Shells.

DEPOTS: 296 Broadway, New York. Mills At WATERBURY, 189 Eddy St., Providence, R. I. Conn.



**BROWN'S PATENT
PICTURE
HOOK.**

Warranted to hold 100 lbs.

Manufactured only by

Manhattan Brass Co.,

1st Ave., 27th to 28th St.,

New York.

Solid brass, price, \$4 per

gross, less 25% discount.

**THE NEW HAVEN
COPPER CO.,**

255 Pearl Street, New York.

Manufacturers of and Dealers in

**Braziers' & Sheathing
COPPER.**

Kettle Bottoms, Bolts, Circles, Rivets,
Ingot Copper, Spelter, Solder, &c.

Metals.

**The Plume & Atwood
Mfg. Company,**

MANUFACTURERS OF

SHEET and ROLL BRASS and WIRE,

German Silver and Gilding Metal,

Copper Rivets and Burs,

Kerosene Burners,

Lamp Trimmings, &c.

80 Chambers Street, New York.

13 Federal Street, Boston.

109 Lake Street, Chicago.

Rolling Mill,

Factories,

THOMASTON, CT. WATERBURY, CT.

Bridgeport Brass Co.,

MANUFACTURERS OF

Sheet and Roll Brass,

Brass & Copper Wire & Tubing,

German Silver Metal and Wire,

Copper and Iron Rivets.

OILERS and CUSPADORES, LAMPS and TRIMMINGS,

KEROSENE BURNERS, KEROSENE BURNERS,

Clocks & Fly Fan Movements. PLUMBERS' MATERIALS.

Particular attention paid to cutting out Blanks and

manufacturing Metal Goods.

MANUFACTORY, WAREHOUSE,

Bridgeport, Conn. 19 Murray St., N. Y.

Harrison Wire Company,

ST. LOUIS, MO.

THOS. W. FITCH, Pres. and Treas. CHAS. F. Secretary.

MANUFACTURERS OF

All kinds of

IRON & STEEL WIRE

AND

Wire Mill Specialties.

Holmes, Booth & Haydens,

WATERBURY, CONN.

NEW YORK. BOSTON.

49 Chambers St. 18 Federal St.

Manufacturers of all kinds of

Brass, Copper & German Silver,

ROLLED AND IN SHEETS.

BRASS & COPPER WIRE,

Tubing, Copper Rivets & Burs.

BRASS & IRON

JACK CHAIN, DOOR RAIL.

German Silver Spoons.

SILVER PLATED FORKS & SPOONS,

Kerosene Burners, &c.

JOHN DAVOL & SONS,

Agents for

Brooklyn Brass and Copper Co.,

Dealers in

Ingot Copper, Spelter, Lead, Tin,

Antimony, Solder & Old Metals.

100 John Street, N. Y.

PASSAIC ZINC CO.

Manufacturers of

Pure Spelter

FOR

Cartridge Brass, Gas Fixtures, Bronzes

AND ALL FINE WORK.

Also for

Galvanizers & Brass Founders.

MANNING & SQUIER, Gen'l Agents

113 Liberty Street, N. Y.

Geo. W. Prentiss & Co.,

HOLYOKE, MASS.,

MANUFACTURERS OF

IRON WIRE.

Bright, Coppered, Annealed and Tin

Plated. Also GUN SCREW WIRE.

Of all sizes straightened and cut to order

W. T. WELLS,

Sole Agent for Foxell, Jones & Co., manufacturers of

HOLLOW WARE,

and Broker in

PIG IRON.

78 Beckman Street, New York City.

Wire, etc.

PHILIP L. MOEN,
President & Treasurer.

CHARLES F. WASHBURN,
Vice President & Secretary.

Washburn & Moen Mfg. Co.

Established, 1831.

Capital, \$1,500,000

WORCESTER, MASS.

WIRE DRAWERS.

Patent Galvanizing, Rolling and Tempering.

MANUFACTURERS OF

IRON, AND IRON AND STEEL WIRE.

Of Every Description.

A SPECIALTY MADE OF

GALVANIZED TELEGRAPH WIRE,

GALVANIZED TELEPHONE WIRE,

PATENT STEEL WIRE BALE TIES,

PATENT STEEL BARB FENCING,

AND PUMP CHAIN.

NEW YORK OFFICE:

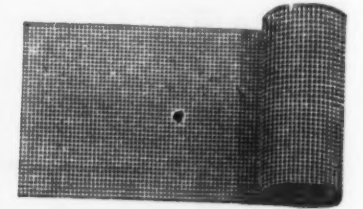
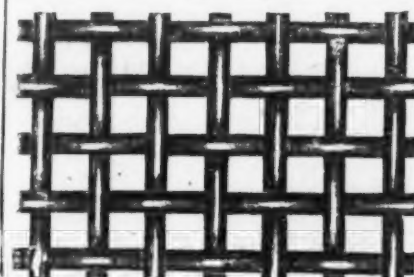
31 Cliff St.

ST. LOUIS OFFICE:

707 No. Second St.

CHICAGO OFFICE:

215 and 217 Lake St.



NATIONAL WIRE AND LANTERN WORKS,

Warehouse, 45 Fulton Street, New York.

HOWARD & MORSE,

Manufacturers of

Brass, Copper and Iron WIRE CLOTH,

Locomotive Spark Wire Cloth, Iron Wire Bolting Cloth,

Ship and Railroad Lanterns, Signal Lights, Conductor's Lantern

ADJUSTABLE GLOBE HAND LANTERN,

Desk and Office Railing, Riddles, Coal and Sand Screens, Nursery

Fenders and Spark Guards, Ornamental Wire Fence.

WORKS

AT

TRENTON,

N. J.

ROEBLING'S

WIRE ROPE

New York Office

AND

Warehouse

AT

117 Liberty Street

THE JOHN A. ROEBLING'S SONS CO.,

MANUFACTURERS OF

WIRE ROPE

OF

Iron, Steel and Copper

FOR

Hoisting Purposes of all

kinds, for Ferries, Stays,

Ship Rigging, Sash Cords,

Lightning Rods, &c., &c.

Suspension Bridge Cables.

GALVANIZED

Telegraph Wire,

Market Wire,

Vineyard Wire.

Iron and Steel

WIRE

FOR

Market Wire, Fence Wire

Bridge Wire, Chain Wire,

Buckle Wire, Spring Wire,

Rivet Wire, &c., &c.

GALVANIZED WIRE CLOTHES LINES.

IRON AND STEEL WIRE ROPE

For Hoisting, Running & Standing Ropes, Ferries, &c.

CONSTANTLY KEPT ON HAND.

Address, HAZARD MFG. CO., Wilkesbarre, Luzerne Co., Pa.

FELTEN & GUILLEAUME,

Carlswerk, near Cologne, Germany.

PATENT CRUCIBLE STEEL WIRE,

For Mining and Plow Ropes, Hawsers and Bridge Cables.

SIEMENS-MARTIN AND BESSEMER STEEL WIRE,

Flusselsien, Swedish and German Charcoal Wire.

GALVANIZED TELEGRAPH WIRE

of Charcoal and Swedish Iron and Steel, also with high conductivity, and in long lengths.

GALVANIZED STEEL WIRE,

For Plain, Barb and Strand Fencing, 3, 4 and 7 ply Strand, Staples, &c. Annealed and Oiled Fencing

Wire, round and oval.

WIRE ROPE

OF EVERY DESCRIPTION.

TELEGRAPH CABLES.

Contractors to the German and Foreign governments. The oldest house in the branch on the Con-

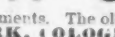
tinent. Telegraph Address, CARLSWERK, COLOGNE.

J. WOOL GRISWOLD,

Manufacturer of

WIRE,

TROY, N. Y.



WIRE RAILING

AND

Ornamental Wire Works.

DUFUR & CO.,

Manufacture WIRE RAILING for Cemeteries, Balco-

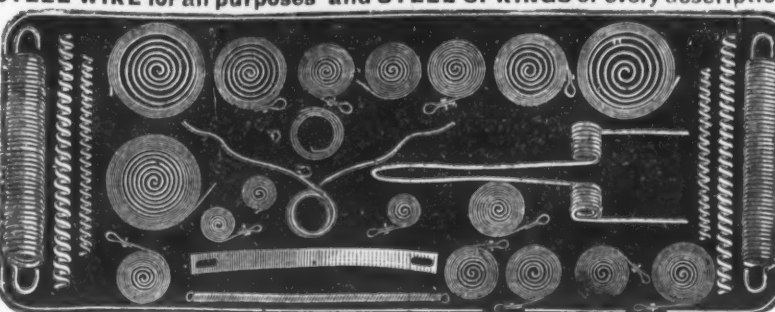
nies, &c.; Sieves, Fenders, Cages, Sand and Coal

Screens, Woven Wire, Iron Bedsteads, Chairs,

Settees, &c.

O. LINDEMANN & CO.,
Patentees and Sole Manufacturers of
Spring Brackets for Bird Cages,
And manufacturers of the largest variety of
**Japaned, Brass and Tin-Plated Bird
Cages in this Country.**
Catalogues furnished to the trade.
254 Pearl Street, New York.

CARY & MOEN,
Manufacturers of
STEEL WIRE for all purposes and STEEL SPRINGS of every description.



Market Steel Wire, Crinoline Wire, tempered and covered.
Also Patent Tempered Steel Furniture Springs, constantly on hand.
234, 236 and 238 West 29th Street, NEW YORK.

YALE LOCKS.
YALE LOCK MFG. CO.
OFFICE AND WORKS,
STAMFORD, CONN.,
SALESROOMS,
53 Chambers St., New York.
36 Pearl St., Boston.
506 Commerce St., Philadelphia.

BROWN & BROTHERS,
81 Chambers St., N. Y. Waterbury, Conn.
Manufacturers of

**BRASS, COPPER AND
GERMAN SILVER,**

In Sheets, Rods, Wire, Tubing,
Rivets and Burs, Etc.

ALSO,

Seamless Brass & Copper Tubing.
PATENTED SEAMLESS BRASS AND COPPER
HOUSE BOILERS, warranted to stand 200 lbs.
pressure and guaranteed against vacuum.

PATENTED SPRING TEMPERED SHANK,
SILVER-PLATED, FLAT TABLE WARE, in rich
designs.

GERMAN SILVER SPOONS AND FORKS.

**St. Louis Malleable Iron
Company,**
2116 MARKET STREET,
ST. LOUIS, MO.

HENRY M. FILLEY, President. JOHN D. FILLEY, Secretary.

MANUFACTURERS OF
**Malleable and Gray
Iron Castings,**
GENERAL HARDWARE, &c.

ROME IRON WORKS,
Manufacturers of

**Brass, Gilding Metal, Cop-
per and German Silver**

(In Sheets, Rods, Tubing or Wire).

**COPPER & BRASS RIVETS
AND BURS.**
Rome, New York.

P. W. GALLAUDET,
Banker and Note Broker,
Nos. 3 and 5 Wall Street,
NEW YORK.

HARDWARE, METAL, IRON RUBBER, SHOE,
PAPER AND PAPER-HANGINGS, LUMBER, COAL
AND RAILROAD PAPER WANTED.

ADVANCES MADE ON BUSINESS PAPER AND
OTHER SECURITIES.

Geo. A. Boynton
BROKER IN IRON
70 WALL ST., N.Y.


I. SCHOENBERG, Pres. S. BLONDHEIM, Sec'y.
The Schoenberg Metal Mfg. Co.,
Manufacturers of and Dealers in
SOLDER, TYPE,
Stereotype, Electrotype and Babbitt Metals.
Importers of Block Tin, Antimony, &c. Refiners of
Lead, Spelter, &c. Highest prices paid for Old Metals
and all kinds of Dross. 522 and 530 East 20th
Street, between Avenues A & B, New York.

S. L. SAMUEL.
P. O. Box 1300. 57 Cedar St., N. Y.
Manufacturers' EXPORT Agent for
Hardware, Brassware, Glassware,
WOODENWARE,
Kerosene Goods, Burners, Wicks, Oil.
Late Agent for Wm. H. Samuel & Co.
Orders sent direct will save the purchaser all inter-
mediate profits.

R. SELLEW & CO.
Dealer in **METALS,**
Tin Plate, Sheet Iron, Copper, &c.
SAINT LOUIS.

STANLEY RULE AND LEVEL CO.,

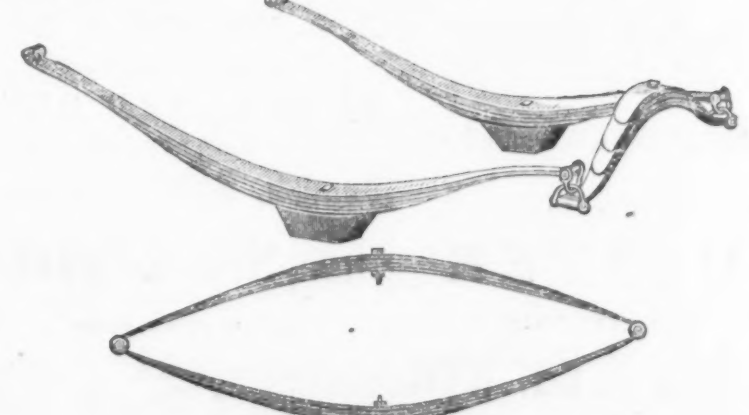
MANUFACTURERS OF
**Improved
Carpenters'
Tools.**
Factories,
New Britain, Conn.
Warehouses,
29 Chambers St.,
New York.



Manufacturers of Bailey's Patent Adjustable Planes.
Agents for the sale of Leonard Bailey & Co.'s "Victor Planes."

This Advertisement is Changed Every Week.

D. G. GAUTIER, Chairman D. J. MORRELL, Treasurer. CHAS. BOUGLASS, Gen'l Supt.
GAUTIER STEEL CO., LIMITED.
**STEEL,
WIRE and SPRINGS.**



WORKS,
JOHNSTOWN, PENN.
Eastern Warehouse, 93 John St., N. Y.; Philada. Warehouse, 505 Commerce St.

MONITOR TIN PLATE WORKS,
54 Cliff Street, New York,
Manufacturers of
LARGE TINNED SHEETS for DAIRY and OTHER PURPOSES, COTTON CANS,
and all special sizes, shapes, gauges and qualities, from 10 to 40 inches wide, 10 to 75 inches long.
Guaranteed Equal in Every Respect to Best Imported.

CONDIT, WICK & CO.,
Iron Manufacturers and Merchants,
Wholesale Dealers in
Sheet, Tank and Plate Iron, Nails, Glass, Horse Shoes, Horse Nails,
and other articles of HEAVY HARDWARE.
CLEVELAND, OHIO.

EAGLE FACING MILLS AND PLUMBAGO WORKS,
CINCINNATI, O.,
MANUFACTURERS OF

**Foundry Facings and Blackings, Black Lead and
Lubricating Plumbago,**
Foundry Supplies, Monk's Molders' Tools, Molding Sands.
Our Return Facings are used by all first-class Store Manufacturers. Our Heavy Black-
ings are used by the U. S. Government, by the leading Railroad Foundries, and wherever
heavy castings are made.
QUALITY GUARANTEED THE BEST. SEND FOR PRICES.
S. OBERMAYER & CO., Prop'rs.

COXE BROS. & CO.,
Cross Creek Lehigh Coal.
The Purity and Strength of this Coal especially adapt it for the work
of Iron and Metals.
GENERAL OFFICE, 12 & 14 Trinity Building, 111 Broadway, New York.
BRANCH OFFICE, 206 Walnut Place, Philadelphia.
E. B. & S. W. ELY, Agents, P. O. Box 262, N. Y.

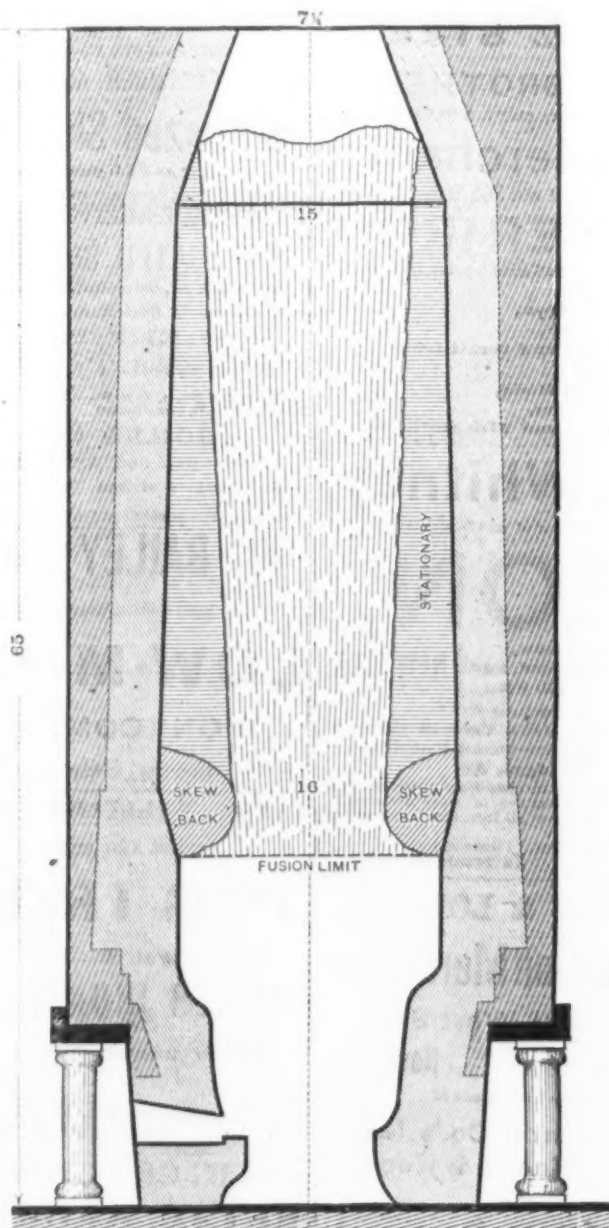
the heat cannot be concentrated, white iron
results; the furnace is blown out and a new
bosh put in.

By taking a furnace of the proposed form
(see Fig. 3), and placing the bosh far enough
above the fusion limit to avoid the danger
of the jamming of the stock on the bosh, the
difficulties of the old form are avoided. Any
pastiness of stock will occur between verti-
cal walls, the heat will be concentrated and
the blast equalized. The only objection to
extending the bosh so high is that it will add
10 per cent. to the height of the furnace. As
its upper part is simply a hopper to hold the
stock during reduction, its shape will be im-
material so long as the charging apparatus
can distribute the stock evenly. The mantel
of this furnace is higher than any used
(except that on Lucy No. 2, Pittsburgh), and
is placed 2 feet below the fusion limit, which
can now be ascertained closely. The well is
formed of a 12-inch wall, and surrounded by
a water jacket extending from the mantel to
below the hearth line.

I would advise that two pyrometers be
placed in the sides of the furnace above the
bosh, to determine the interior temperature
and detect any change of heat, and that one
be located in the escaping flue, in order to
ascertain the temperature of the gas, as it is
necessary to maintain a certain equilibrium
of temperature in each zone of the furnace,
because the iron will change as soon as one

the coal, there are indications of old work-
ings. A shaft 4 to 5 feet in diameter reaches
the coal at about 14 yards from the surface,
and from it the coal has been worked away
by a mode which appears to have been simi-
lar to the "punch and thirl" system. The
greatest depth of these old workings is gen-
erally not more than 16 yards, and they are
drained by an adit from the lowest point.
In one of these an oaken shovel was found
buried in the debris, and as the workings
did not seem to date back further than the
latter part of the sixteenth century, good
mining work has evidently been successfully
accomplished (the shaft of this pit being of
admirable construction) with far ruder
implements, in many cases, than we are
aware of.

Owing to the high dip of the beds of this
coal field, 14 to 16 inches to the foot, the coal
has to be worked by a system of pillars, 40
feet long by only 10 feet thick, the great in-
clination not allowing them to be any
broader. The mode of working adopted
throughout this section can be explained in
a few words. The main level or "horse
road" is driven horizontally with the cleat
of the coal, together with an "air-head," 10
yards off on the upper side, which is
"thirled" into every 20 yards for ventila-
tion. This air-head afterward takes the re-
turn air from the workings to the "up-take,"
and no miner is allowed to enter it. At



Notes on the Blast Furnace.—Fig. 4.—Skew-back in a Furnace.

zone encroaches on another. To establish
and maintain this equilibrium is the work of
the future. A furnace built as above de-
scribed will retain its shape and take a cer-
tain uniform volume of blast, because the
contents of zones of combustion and reduc-
tion will bear a fixed relation to one another.
With reserve power in the stoves, a burden
of ore can then be determined upon that
needs no changing, as by varying the heat
of the blast, iron of any quality can be pro-
duced.

The North Staffordshire Coal and Iron
District.*

BY WM. HAMILTON MERRITT.

The North Staffordshire coal field has the
Cheshire and Lancashire fields some 35 miles
to the north, those of Derbyshire and Notting-
hamshire 40 miles to the east, those of South
Staffordshire and Shropshire about 30 miles
to the south, and the Derbyshire and Flint-
shire fields some 40 miles to the west. It is
highly probable that the coal continues under
the new red sandstone to the Western and
Southern fields, as the dips on both sides,
and absence of large faults, make it impos-
sible to come to any other conclusion. In a
section of this coal field, from Chatterly to
Whitfield, 32 workable seams of coal are
shown, of an aggregate thickness of 130
feet, varying from 2 feet 6 inches to 7 feet,
and 13 seams of ironstone, 24 feet, averag-
ing from 2 to 4 feet. All of these seams
have been minutely described in a paper by
Mr. Charles J. Homer, read in 1875 before
the British Iron and Steel Institute. In the
Northern part, to which I especially wish to
direct your attention, the beds lie in a V-
shaped basin, the underlying millstone grit
and Yaredale rocks, rising and forming es-
carpments on either side of the valley con-
taining the coal.

Throughout this district, at the outcrop of
*Read before the New York meeting of the
American Institute of Mining Engineers.

every 160 yards a "bord" or "brake-dip"
(so called from a brake situated at the top to
allow the full car to pull up the empty one)
is driven "up bank" at right angles to the
main level, the longest being 110 yards. A
smaller bord for air is likewise run up
beside this and thirled into every 10 yards.
On reaching the top, two drifts are put out
from each brake-dip at 10 yards apart,
and the air "bratticed" up by canvas for
40 yards, when it is thirled. These drifts
from either side meet at 80 yards, and, after
thirling again, the narrow pillars (of 40 by
10 yards, as before mentioned) are worked
away against the cleat, the air being made
to pass along the face of the work, and then at
once to the up-take air head. As soon as
taking away the pillars above is fairly com-
menced the next drift is driven, so that the
working of the pillar above is always slightly
in advance of that immediately below.

The ironstone in this district occurs, as
before mentioned, in beds of about 2 to 4
feet in thickness, interstratified with the
coal, consisting chiefly of solid bands with
occasional nodules, and sometimes contain-
ing shells of the bivalve *anthracomya*. As
they are worked nearer the surface than the
coal on the west side of the valley (well
seen at New Chapel), the dip is inconsid-
erable. Owing to the thin beds, ponies are
used entirely, and the mode of getting the
stone to the main levels is one of the most
primitive to be seen anywhere. A man
loads the ore on a wooden sleigh, which he
then drags on his hands and knees through
a small road, made through the gob by pack-
ing up with stones on each side. The iron-
stone is worked away in a face of 30 yards
by "holing" the shale below and putting
the shot in above.

The facilities for iron-smelting will be
readily conceived when it is taken into
consideration that we have blast fur-
naces situated at the mouths of pits, which
work the seams of coal mentioned above,
the ore a short mile off and beds of carboni-
ferous limestone close at hand, worked by the
Astbury Lime Company. The advantages

<p>Iron. NEW YORK.</p> <p>OGDEN & WALLACE, Successors to G.M. G. SMITH & CO., IRON & STEEL, 85, 87, 89 & 91 ELM ST., N. Y.</p> <p>MIDVALE STEEL WORKS. A full assortment constantly on hand of Cast, Machinery, Tool, Spring, Tire, Sleigh Shoe, Tee Calk, Pipe and Blister Steel. Orders solicited for Steel Tyres and Axles, Steel Forgings and Castings.</p> <p>PIERSON & CO., 24 & 26 Broadway, 77 & 79 New St., NEW YORK CITY.</p> <p>"PICKS" of all kinds, "ESOPUS" HORSE SHOE IRON, BEAMS, ANGLES, Tees, Channels, Sheets, Plates. All descriptions in stock.</p> <p>IRON & STEEL. ABEEL BROTHERS, Established 1765 by ABEEL & BYVANCK, Iron Merchants, 190 South Street and 365 Water, N. Y.</p> <p>ULSTER IRON A full assortment of all sizes constantly on hand. Refined Iron, Horse-Shoe Iron, Common Iron, Band, Hoop and Scroll Iron, Sheet Iron, Norway Nail Rods, Norway Shapes, Cast, Spring and Tire Steel, etc.</p> <p>A. R. Whitney, Manufacturer of and Dealer in IRON, 56, 58 & 60 Hudson, 49, 50 & 52 Thomas, and 12, 14 & 16 Worth Sts., } NEW YORK. Our specialty is in Manufacturing Iron Used in the Con- struction of Fire-Proof Buildings, Bridges, &c. Plans and estimates furnished, and contracts made for erecting iron structures of every description. Books containing cuts of all iron made sent on ap- plication by mail. Sample pieces at office. Please address 58 Hudson Street.</p> <p>BORDEN & LOVELL, Commission Merchants 70 & 71 West St., New York. Agents for the sale of Fall River Iron Co.'s Nails, Bands, Hoops & Rods. AND Borden Mining Company's Cumberland Coals. ELIZABETHPORT ROLLING MILL, Elizabethport, N. J., Common and Refined BAR IRON, Fish Plates, Spikes, &c. Address, DANIEL W. RICHARDS & CO., Importers of and Dealers in Scrap Iron and Metals, 88 to 96 Mangin St., New York.</p> <p>WILLIAM H. WALLACE & CO., IRON MERCHANTS Cor. Albany & Washington Sts., NEW YORK CITY. WM. H. WALLACE. WM. BISPHAM.</p> <p>DANIEL F. COONEY, Late of and Successor to Jas. H. Holdane & Co., 88 Washington St., N. Y. BOILER PLATES and SHEET IRON, LAP WELDED BOILER PLATES, Boiler Rivets, Angle & T Iron, Cut Nails & Spikes. Agency for Putnam Iron Co., Vindict Iron Works, a famous Rolling Mills, Pine Iron Works, Laurel Iron Works, The Bergen Rolling Mills, at Jersey City.</p> <p>Houdlette & Ellis, Manufacturers of and Dealers in MERCHANT BAR IRON, Homogeneous Steel and iron Boiler Plates, Sheet and Tank Iron, Boiler, Tank and Safe Rivets. Best Lap-Welded Iron Boiler Tubes, Wrought Iron Girder, Deck, and Channel Beams, Angle, T and Grooved Iron. Steel and Iron Forgings, Bessemer Steel Cut Nails, Genuine and Standard Rabbit Metals, Crescent Brand Journal Bearings. 39 to 31 Hattymarch Street, Boston.</p>	<p>Iron. NEW YORK.</p> <p>A. B. Warner & Son, IRON MERCHANTS, 28 & 29 West and 52 Washington Sts. BOILER PLATE, Boiler Tubes, Angle, Tee & Girder Iron, Boiler and Tank Rivets. Sole Agents for the celebrated "Eureka," Pennocks, "Wawasset," Lukens, Brands of Iron. Also all descriptions of Plate, Sheet, and Gasometer Iron. Special attention to Locomotive Iron. Fire Box Iron a specialty.</p> <p>ROME MERCHANT IRON MILLS, ROME, N. Y., Manufacturers of the best grade of Bar Iron, Bands and Fine Hoops. Scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and Horse Shoe Iron. Also from Charcoal Pig a superior quality of iron branded J. G. All puddled balls re- duced by hammer. Orders may be sent to the Mill or to J. O. CARPENTER, our Agent, at 59 John Street, New York.</p> <p>MARSHALL LEFFERTS, 90 Beekman St., New York City, MANUFACTURER AND DEALER. Galvanized Sheet Iron, 1st and 2d Qualities. Galvanized Wire, Telegraph and Fence; Galvanized Hoop and Band Iron, Galvanized Rod and Bar Iron, Galvanized Nails, Galvanized Chain, Galvanized Iron Pipe. CORRUGATED SHEET IRON For Roofing, &c., Galvanized, Plain or Painted. Best Charcoal, Best Refined and Common SHEET IRON. Plate and Tank Iron, C No. 1, C H No. 1, C H No. 1 Flange, Best Flange, Best Flange Fire Box, Circles. BOILER IRON Stamped and Guaranteed. All descriptions of Iron Work Galvanized or Tinned to order. Price list and quotations sent upon application.</p> <p>W. BAILEY LANG, Sole Agent in United States & Canada for LOW-MOOR IRON COMPANY, NO. 50 BEEKMAN ST., NEW YORK. JAMES WILLIAMSON & CO., SCOTCH AND AMERICAN PIG IRON, No. 69 Wall St., New York. ULSTER IRON WORKS, 90 Broadway, New York.</p> <p>Tuckerman, Mulligan & Co O. W. GRAVES & CO., Cor. Cliff and Beekman Sts., New York. METAL BROKERS, TIN PLATE, PIG TIN, IRON WIRE, SHEET IRON, BRASS and COPPER GOODS, &c. Passaic Rolling Mill Co., PATERSON, N. J. Iron Bridge Builders And Manufacturers of Beams, Channels, Angles, TEES, Merchant Iron, &c., &c. New York Office, 135 Chambers Street. WATTS COOKE, President. W. O. FAYERWEATHER, Treasurer.</p> <p>CARMICHAEL & EMMENS, DEALERS IN Iron & Steel Boiler Plate, Lap Welded Boiler Tubes, &c., &c., 130 & 132 Cedar Street, New York. Agent for Otis' celebrated Cast Steel Boiler Plates, The Coatesville Iron Co. and The Laurel Rolling Mills.</p> <p>HUGH W. ADAMS, DEALER IN FOREIGN AND AMERICAN RAILWAY, PIG AND SCRAP IRON. Estimates furnished for all kinds of Iron Work. 56 PINE STREET. D. L. COBB. NEW YORK.</p>	<p>Iron. NEW YORK.</p> <p>John W. Quincy, 98 William Street, New York. Anthracite & Charcoal Pig Irons, Wrought Scrap, Cut Nails, Copper, BLOCK TIN, LEAD, SPELTER, ANTIMONY, NICKEL, &c.</p> <p>HARRISON & GILLOON IRON AND METAL DEALERS, 553, 560, 562 WATER ST., and 802, 804, 308 CHERRY ST., NEW YORK. have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car-Wheels, Axles and Heavy Wrought Iron; also old Copper, Composition, Brass, Lead, Pewter, Zinc, &c.</p> <p>OXFORD IRON CO., (B. G. CLARKE, Receiver.) Cut Nails AND SPIKES. J. S. SCRANTON, Sales Agent, 81, 83 and 85 Washington Street, NEW YORK.</p> <p>BURDEN'S HORSE SHOES. "Burden Best" Iron Boiler Rivets. Burden Iron Works, H. Burden & Sons, Troy, N. Y.</p> <p>ULSTER AND BURDEN'S H. B. & S. Bar Iron. Also Best Grades of American & English Refined Iron. All sizes and shapes in stock. EGLESTON BROS. & CO., 166 South St., } NEW YORK CITY. 267 Front St., }</p> <p>B. F. JUDSON, Importer of and Dealer in SCOTCH AND AMERICAN Pig Iron, Wrought & Cast Scrap Iron, OLD METALS. 457 & 459 Water St., } 433 & 235 South St., } NEW YORK.</p> <p>W. S. MIDDLETON, BROKER AND BUYER OF IRON, Railroad, Mining and Steamship Supplies, Machinery, Hardware & Tools, 52 JOHN STREET, Room 5. NEW YORK.</p> <p>Glengarnock and Carnbroe SCOTCH PIG IRON. For spot delivery and for prompt or forward shipments to New York, Boston, Philadelphia, Baltimore or New-Orleans. For sale in lots to suit by JAMES LEE & CO., Sole Agents for the United States, 72 Pine Street, New York.</p>	<p>Iron. PITTSBURGH.</p> <p>W. D. WOOD & CO.'S  PATENT Planished Sheet Iron. Patented March 14th, 1865; April 8th, 1873; Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876. Guaranteed fully equal in all respects to the IMPORTED RUSSIA IRON, and at a much less price. FOR SALE, by all the principal METAL DEALERS In the Large cities throughout THE UNITED STATES. And at their Office, 111 Water Street, PITTSBURGH, PA. The U. S. Iron and Tin Plate Co., OF PITTSBURGH, PA., Manufacture to order BEST REFINED CHARCOAL AND POLISHED SHEET IRON, Taggers Iron and Bessemer Steel Plate, in quality and size to suit the wants of consum- ers. Also Best Charcoal Terne Plates in Special Sizes, from 10x17 to 20x30. Orders solicited. Inquiries promptly answered. Address P. O. Box 24, Pittsburgh, Pa. Works at Demmler, Allegheny Co., Pa. Eastern Sales Agents: 1322 Market st., Phila. 114 John st., N. Y. 35 Oliver st., Boston. ELY & WILLIAMS, Dealer in IRON and STEEL. Old Rails, Wheels, Axles, Springs, Scrap, Turnings, &c., PIG IRON, BLOOMS AND ORE, Duquesne Way, near 6th Street, PITTSBURGH. C. A. von Bonnhorst. R. A. Wilson.</p> <p>R. A. WILSON & CO., PIG IRON, BLOOMS AND ORE, 88 Fourth ave., cor. Wood st., Pittsburgh.</p> <p>Bonnell, Botsford & Co., Iron, Nails & Spikes. YOUNGSTOWN, OHIO. Agency of N. M. HÖGLUND'S SONS & CO., Stockholm. Swedish & Norway Iron of every description. Stock on hand at Boston, New York and Philadelphia. Importation orders a specialty. GUSTAF LUNDBERG, 38 Kilby st., Boston. ALBERT POTTS, Philadelphia Agent, 234 & 236 N. Front Street.</p> <p>ZUG & CO., Pittsburgh, Pa., Manufacturers of Wheeler's Iron & Steel Combination Shafting, Under license of the Combination Trust Co., Philadelphia. This Shafting is superior to any now on the market, and the attention of machinists is particularly called to it and a trial order solicited. Prices furnished on application.</p> <p>LEECHBURG IRON WORKS. KIRKPATRICK, BEALE & CO. Manufacturers of all grades of FINE SHEET IRONS, (Refined, Cold Rolled, Show Card, Stamping, Tea Tray, Polished, Shovel.) TIN AND TERNE PLATES, made with Natural Gas as fuel. OFFICE, No. 116 Water St., Pittsburgh, Pa. WORKS, Leechburg, Pa. Mill, Allegheny City, Pa.; Office, Cor. Water and Market Sts., Pittsburgh, Pa. ANDREW KLOMAN, Pittsburgh, Pa., Manufacturer of STEEL AND IRON STRUCTURAL MATERIAL. Kloman Patent Universal Mill-Rolled Eye Bars. LIGHT STEEL AND IRON RAILS.</p> <p>MOULDING SAND. Albany Sand a Specialty, FOUNDRY FACINGS, Shovels, Riddles, Brushes, &c. WHITEHEAD BROS. AMERICAN FACING CO. WM. WHITEHEAD, Treas., 517 W. 15th St. New York.</p>	<p>Iron. PITTSBURGH.</p> <p>A. G. HATRY, Commission Merchant. Bar, Sheet, Tank, Boiler, Angle, T, and Railroad Iron, And Railroad Equipment. Nails & Spikes Steel & R. R. Supplies. WINDOW GLASS, GAS PIPE & BORAX. PITTSBURGH, PA.</p> <p>JUNIATA  ROADSTER PATTERN. SNOW SHOES. The only Snow Shoes in the market that abso- lutely prevent all balling and give universal satis- faction. Improved Snow Shoe Shapes. Standard Sizes. 5/8x7-16, 11-16x7-16, 3/4x7-16, 13-16x7-16, 7/8x7-16, 15-16x7-16, 15-16x8, 12x8, 11-16x8, 11-16x9. STEEL TOE CALKS. SHOENBERGER & CO., Pittsburgh, Pa.</p> <p>Portsmouth Iron and Steel Co., Successors to CAYLORD ROLLING MILL CO., Manufacturers of Siemens-Martin (Open Hearth) STEEL BOILER PLATE, Agricultural and Machinery Steel and Steel Tire. Also, Homogeneous Iron Boiler Plate and Rivets, Merchant Bar, Hoop and Sheet Iron, Wrought Spikes, Fish Bars and Bolts. Office and Works: J. C. LEWIS, GEO. S. LEWIS, Pres't and Gen'l Sup't. Sec'y and Treas. John I. Williams. Henry M. Long. Nathan M. McDowell.</p> <p>Keystone Rolling Mill, Williams, Long & McDowell, Manufacturers of Merchant Bar and Skelp Iron, Sheets and Plates of all sizes, Office, No. 87 Water Street, Pittsburgh, Pa. Mill at Sono, Second Avenue.</p>
--	--	---	---	---

Iron.
PHILADELPHIA.
**Siemens' Regenerative
GAS FURNACE.**
RICHMOND & POTTS,
119 S. Fourth St., PHILADELPHIA, PA.

The Cambria Iron and Steel Works,
Having enjoyed for over TWENTY YEARS the reputation of producing the best quality of
RAILS,
have now an annual capacity of
100,000 Tons of Iron and Steel Rails, Splice Bars, &c.
ADDRESS,
CAMBRIA IRON COMPANY,
No. 218 South 4th Street, Philadelphia.
Or at the Works, **JOHNSTOWN, PA.**
Or **LENOX SMITH,** New York Selling Agent, 46 Pine St., N. Y.

THE PHOENIX IRON CO.,
410 Walnut Street, PHILADELPHIA.
Manufacturers of
**CURVED, STRAIGHT AND HIPPED
Wrought Iron Roof Trusses, Beams, Girders & Joists,**
and all kinds of Iron Framing used in the construction of Iron Roof Buildings.
DECK BEAMS, CHANNEL, ANGLE AND T BARS
curved to template, largely used in the construction of Iron Vessels.
PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,
For Top and Bottom Chords of Bridges.
Railroad Iron, Street Rails, Rail Joints and Wrought Iron Chairs.
REFINED BAR, SHAPING, and every variety of SHAPE IRON made to Order.
Plans and Specifications furnished. Address,
DAVID REEVES, President.

ALAN WOOD & CO.,
MANUFACTURERS OF
Patent Plated, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom
PLATE & SHEET IRON,
No. 519 Arch St., Philadelphia, Pa.
Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack,
Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

NAILS
JAS. ROWLAND & CO.,
Kensington Iron, Steel & Nail Works,
920 North Delaware Ave., - - PHILADELPHIA,
Manufacturers of the
Anvil Brand Refined Merchant Bar Iron.
Also, the James Rowland & Co. Kensington Nails, cut from their
Refined Anvil stock. Also, Plow and Cultivator Steel, Rounds,
Squares, Flats, Bands and Hoop Iron.
Correspondence with Dealers solicited.

PENCOYD IRON WORKS.
A. & P. ROBERTS & CO.,
Manufacturers of
CAR AXLES.
BAR, ANGLE, TEE AND CHANNEL IRON.
Office, No. 265 S. Fourth St., Philadelphia. Agents for the sale of Glamorgan Pig Iron.

FOUNDRIY FACINGS.
**MANUFACTURERS' FOUNDRY
SUPPLIES.**
MOULDING SAND
J. W. PAXSON & CO.
514, 516 and 518 Beach St., Philadelphia, Pa.
GERMAN LEAD, BITUMEN, SIEVES, MACHINERY SAND,
AMERICAN LEAD, ANTHRACITE, SHOVELS, BRASS
GRAPHITE, CHARCOAL, BRUSHES, CHANDELIER
PLUMBAGO, MINERAL, CRUCIBLES, STOVE PLATE
OFFICE & STOREROOMS,
514, 516 and 518 Beach St., Philadelphia, Pa.

ALLENTOWN ROLLING MILL COMPANY,
Manufacturers of
Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes,
Rivets, Bolts and Nuts, &c. Bridges and Turn Tables.
General Office, 303 Walnut St., Philadelphia. Works at Allentown, Pa.
JAMES C. BOOTH. THOMAS H. GARRETT. ANDREW A. BLAIR.
BOOTH, GARRETT & BLAIR,
Analytical and Consulting Chemists,
919 and 921 Chant St. (10th St. above Chestnut St.), PHILADELPHIA, PA.
Established in 1836.
Analyses of Ores, Waters, Metals and Alloys of all kinds. A special department for the
ANALYSIS OF IRON AND STEEL,
fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron, Steel, Iron
Ores, Slags, Limestones, Coals, Clays, Fire Sands, &c. All analyses made by the members of the firm.
Price lists on application.

Iron.
Edward J. Etting,
IRON BROKER AND COMMISSION MERCHANT,
230 S. Third St., Philadelphia, Pa.
Pig, Bar and Railroad Iron.
OLD RAILS, SCRAP, &c.
Agent for the
**Allentown Iron Co. and the
Coleraine Furnaces.**
STORAGE WHARF & YARD,
DELAWARE AVENUE ABOVE CALLOWHILL STREET,
connected by track with railroad.
Cash advances made on Iron.

J. Wesley Pullman,
407 Walnut St., Philadelphia,
MINER, SHIPPER
And Exclusive Sales Agent for Chester Iron
Company's Blue and Red Bessemer
Ores, Hacklebarney, N. J., and Hoff Ore, Port
Oram, N. J. Also of the Brotherton Ore,
Kenvil, N. J.
For Sale.—A limited amount of the celebrated
Hibernia Ore, Cornwall (N. Y.) Hematite, and
"Lake" (Magnetic Bessemer).

J. W. HOFFMAN & CO.,
Iron Merchants & Railway Equipments,
208 South Fourth St., Philadelphia.
Sole agents Glasgow Iron Co. and Pine Iron Works
manufacturers of Muck Bar and all grades of Plate
Iron. Celebrated "Glasgow" and "Pine"
brands for fire boxes and difficult flanging. Pig and
Bar Iron, Rails and all shapes in Iron. Quotations
given on Bridge and Building Specifications.

**THE
STANDARD
STEEL
WORKS.**
LOCOMOTIVE AND CAR WHEEL TIRES,
Manufactured from the celebrated OTIS STEEL.
BRAND
STANDARD.
Quality and efficiency fully guaranteed. Prices as
low as any of the same quality. We manufacture
Heavy and Light Forgings, Driving and Car Axles,
Cranks, Pins, Piston Rods, &c.
Works at Lewistown, Pa.
Office, 220 S. 4th St., Philadelphia, Pa.

**WROUGHT IRON
Boiler Tubes,**
Steam, Gas and Water Pipe.
Oil Well Tubing, Casing and
LINE PIPE.
Cotton Presses, Forgings,
**ROLLING MILL AND
General Machinery.**
READING IRON WORKS,
261 S. Fourth St., Philadelphia.

Connellsville Coke.
ORES, Native and Foreign.
FRANCIS WISTER,
230 South Third Street, Philadelphia.
Best Coke for Furnace and Foundry Use.

J. F. BAILEY & CO.,
216 South 4th St., Philadelphia. 52 Wall St., (Room 8) New York.
Selling Agents
ATKINS BROS.—BEAMS, CHANNELS, RAILS, &c.
**A. & P. Roberts & Co.—Car Axles, Plates, Channels, Tee,
Angle and Bar Iron.**
Philadelphia Agents Central Iron Works, Harrisburg, Pa.—Boiler, Ship and Bridge Plates.
WILLIAM McILVAIN & SONS—Boiler, Ship and Bridge Plates.
BERWICK R. M. BARS AND SHAPE IRON.
Advances on Consignments of Old Material and sales promptly made.

HEBERTON & CO.,
Selling Agents and Commission Merchants
For the sale of
Pig, Bloom, Plate, Bar, Scrap, Galvanized,
Black, Sheet, Pipe and Railroad
IRON,
No. 333 Walnut St., Phila.
Charcoal Bloom and Pig a specialty.

Iron.
JUSTICE COX, JR. CHARLES K. BARNES.
JUSTICE COX, JR. & CO.,
AGENTS FOR
Chickies, St. Charles, Montgomery
and Keystone
Foundry & Forge Pig Iron.
CATASAUQUA MFG. CO.'S
Bar, Angle, Skelp and Sheet Iron.
RAILROAD CAR AXLES.
NEW AND OLD RAILS.
No. 333 Walnut St., Philadelphia.

PETER WRIGHT & SONS,
307 Walnut Street, Philadelphia,
52 Broadway, New York,
44 Second Street, Baltimore,
Importers of
**German and English
SPIEGELEISEN,**
Pig, Scrap,
**NEW AND OLD RAILS,
And Iron Ore.**

E. W. CLARK & Co.
Bankers and Stock Exchange Brokers,
No. 35 South Third St., Philadelphia.
CLARK, POST & MARTIN,
No. 34 Pine St., New York,
Bankers and Railway Commission Merchants,
Importers of
Pig Iron, New and Old Rails, Scrap Iron, &c.

D. W. R. READ. T. HORACE BROWN.
D. W. R. READ & CO.,
General Commission Merchants,
ORES, METALS, &c.
Spanish, Algerian and Domestic Ores or
Iron, Manganese, &c.
205½ Walnut St., PHILADELPHIA.

J. O. RICHARDSON,
IRON COMMISSION MERCHANT,
No. 239 Dock St., Philadelphia.
Pig Iron, Railroad Iron and
Iron Ores.
Sole Agent for the MONOCACY FURNACE CO.
DEALER IN
MOSELEY, ROCKHILL, WARWICK,
And other Favorite Brands.
SILVER GREY IRON A SPECIALTY.
LANGHORNE WISTER. RODMAN WISTER.
L. & R. WISTER,
Brokers and Commission Mer-
chants in Iron, Steel, &c.
Office, No. 323 Walnut St., Philadelphia.

A. PURVES & SON,
Corner South & Penn Streets, Phila.,
Dealers in
Scrap Iron & Metals, Machinery, Tools,
Shafting & Pulleys, Steam Engines,
Pumps & Boilers, Copper, Brass,
Tin, Babbit Metals, Foundry
Facings. Best Quality Ingot Brass.
Cash paid for all kinds of Metals and Tools.
J. J. MOHR,
Iron Commission
Merchant,
No. 430 Walnut Street, Philadelphia.
Sole Agent for the Sheridan and Leesport Furnaces.

BRADLEE & CO.,
Empire Chain Works,
Keystone Horse Shoe Co.
816 Richmond St., Philadelphia, Pa.
Manufacturers of all kinds of Chains. Also
of the Keystone Patent Solid Calk Horse
and Mule Shoes.
These Shoes are made of superior iron, com-
pletely finished and ready for cold shoeing;
have calks and clip. The holes are punched
through at the proper angles and free from
burrs. Same number of Shoes per keg as in
kegs of unfinished shoes.

HEBERTON & CO.,
Selling Agents and Commission Merchants
For the sale of
Pig, Bloom, Plate, Bar, Scrap, Galvanized,
Black, Sheet, Pipe and Railroad
IRON,
No. 333 Walnut St., Phila.
Charcoal Bloom and Pig a specialty.

of this district will be the better realized, however, if I give analyses of some of the coal and ironstone. The analysis of the harder sort of coal, which contains little or no sulphur, and which works admirably in the furnace, I am unable to give; but of samples richer in hydrocarbons from the same district, the two following are good examples:

	Bucknall.	Whitfield.
Carbon.....	85.69	87.50
Hydrocarbons.....	31.52	31.15
Sulphur.....	0.04	trace
Ash.....	2.75	1.19
Total.....	100.00	100.00

The ironstone is calcined in heaps at the mine mouth with inferior coal. Before the operation it varies in richness from 34 to 53 per cent. of protoxide of iron, and after-ward runs as high as 90 odd per cent. of the peroxide. The following analyses of the "Red Shag" and "Red Mine" ores gives a very just example of the ironstones most in use:

	Red Shag.	Red Mine.
	Raw. Cal'd	Raw. Cal'd
Peroxide of iron.....	91.50	92.52
Protoxide of iron.....	45.38	50.90
Peroxide of manganese.....	4.12	2.44
Protoxide of manganese.....	1.76	1.76
Alumina.....	0.32	0.55
Silica.....	0.50	0.86
Lime.....	0.54	1.10
Magnesia.....	0.20	0.34
Sulphide of iron.....	0.32	1.10
Phosphoric acid.....	0.90	1.83
Combined water.....	1.07	0.12
Carbon.....	18.60	8.75
Carbonic acid.....	29.92	33.02
Total.....	100.00	100.00
Metallic iron.....	35.40	64.05
Metallic manganese.....	1.72	1.35
Totals.....	37.12	65.40

Owing to the excellency of its raw materials, this district produces iron unsurpassed by any in the English market, and its boiler plate more than successfully rivals the produce of John Brown & Co., of Sheffield. A statement appeared in the *Journal of the Iron and Steel Institute* for 1875 "that the iron manufactured in North Staffordshire with pure coal was realizing a higher price than any iron in the market." One of its greatest producers, Robert Heath, M. P., vice-president of the Iron and Steel Institute, furnished the iron for the greatest work of its day, namely, the Victoria Bridge at Montreal. It is chiefly owing to this gentleman's industry that North Staffordshire occupies the position she now does among the iron districts of the country, and his enterprise has been rewarded in that he is the largest private ironmaster in Great Britain.

The average height of the furnaces in this district is from 50 to 70 feet; those using coal will not stand a greater height than the latter, to which most of the new ones are being raised. As the coal causes a little coking in the hearth, a process is in some places resorted to which is seldom met with elsewhere. The furnace is found to work better if the sides and bottom of the hearth are cleaned once in every turn of 12 hours, and this is done by running in long bars to loosen the crust, which is then blown out with the steam generated from a bar which is dipped in water before it is thrust down. An average charge is as follows, No. 1 being the quantities used for Red Shag alone, and No. 2 for a mixture of Red Mine (raw 50 per cent.), and Lean Mine (raw 35 per cent.).

No. 1.	Cwt. Qrs.	No. 2.	Cwt. Qrs.
Coal.....	20 0	Coal.....	22 2
Ore.....	20 3	Red Mine.....	10 1
Limestone.....	8 2	Lean Mine.....	8 2
Flue cinder.....	1 3	Limestone.....	5 0
		Flue Cinder.....	2 1

The consumption per ton of pig is about—
Tons. Cwt. Qrs.
Coal..... 1 15 3
Ironstone..... 1 14 4
Limestone..... 8 3
Flue cinder..... 4 3

The puddling is altogether manual, a number of Danks' puddlers in this neighborhood, about the first erected in the country, having been stopped at the commencement of the late depression in trade.

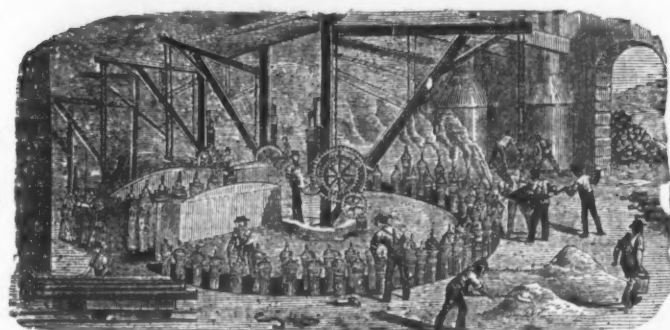
With regard to the cost of production, I might state that in 1877 the coal could be mined in this district at a little under \$1 a ton, and the ironstone from about 75 cents to \$1.15 a ton. The work of getting is let out at so much per ton (averaging in that year for coal from 50 to 75 cents per ton), the contractor employing miners whose daily gain averaged about \$1. In the same manner, by taking the immediate wages at the blast furnace into consideration, a ton of pig iron could be produced at a very little over \$1 a ton for labor. It will be remembered that wages have gone down since 1877, and if they have not yet reached the old figure, these approximate prices would have to be reduced still more to arrive at the present cost of production in this district.

I have briefly placed these facts before the Institute to show, by a good typical example, why England produces iron at a price with which at present, on equal terms, it is almost impossible to compete.

The Topophone.—Professor Morton, of the Stevens Institute of Technology, in his report to the Lighthouse Board, describes a new instrument called a "topophone," by which the exact direction of sounds given by fog horns or fog bells may be promptly determined. The apparatus with which experiments were made consisted of the following parts: A vertical rod passing through the roof of the deck cabin, on the upper end of which was attached a horizontal bar carrying two adjustable resonators. Below these was a pointer, set at right angles with the above bar. Rubber tubes passed through the roof of the cabin and connected with a pair of ear tubes. A handle attached to the vertical rod served to turn it in any direction. Provided with the apparatus above described on board of the lighthouse tender Mistletoe, Professors Morton and Mayer and Mr. French proceeded, on the 10th of September last, to Sandy Hook. There they

McNEALS & ARCHER,

BURLINGTON, N. J.



Flange Pipes.

General Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS.

ESTABLISHED IN 1845.

SINGER, NIMICK & CO.,

PITTSBURGH, PA.

MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement is unequalled for surface finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.; Cast and German Spring and Plow Steel.

"Iron Center" Cast Plow Steel. Finished Rolling Plow Counters with Patent Screw Hubs attached.
"Soft Steel Center" Cast Plow Steel. Agricultural Steel cut to any pattern desired.
"Solid Soft Center" Cast Plow Steel. Steel Forgings made to order.

Represented at 59 BEEKMAN ST., NEW YORK, by

HOGAN & BURROWS, Gen'l Agents for Eastern and New England States.

MIDVALE STEEL WORKS,

CRUCIBLE AND OPEN HEARTH STEEL.

TIRES AND AXLES

OF EVERY DESCRIPTION.



TOOL, MACHINERY AND SPRING STEEL
CASTINGS AND FORGINGS.

WORKS AND OFFICE:

Moctown, Philadelphia, Pa.

WAREHOUSE:

12 N. 5th St., Philadelphia, Pa.

ESTABLISHED 1847.

A. WHITNEY & SONS,

PHILADELPHIA,

CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Trains. Wheels furnished in rough sored or on axles. Chilled castings made to order.

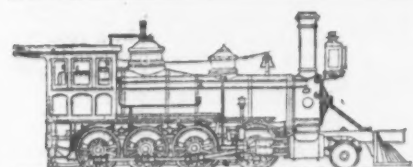
PENNSYLVANIA STEEL COMPANY,

Steel Rails, Frogs, Crossings & Switches.

Forgings for Piston Rods, Guide Bars, Wrist Pins and Machinery Purposes.
Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

Address all orders to

PENNSYLVANIA STEEL COMPANY, 208 South Fourth Street, Philadelphia.



BALDWIN LOCOMOTIVE WORKS,

BURNHAM, PARRY, WILLIAMS & CO., Proprietors,
Philadelphia, Pa., U. S. A.,
Manufacturers of

LOCOMOTIVE ENGINES

of every Description.

Catalogues, photographs and estimates furnished on application of customers.

NOISELESS STEAM MOTORS,

For city and suburban Railways.

These machines are nearly noiseless in operation; show no smoke with the use of anthracite coal or coke as fuel, and show no steam whatever under ordinary conditions of service. They can be run at two or three times the speed of horse cars and draw additional cars. Circulars with full particulars supplied.

CHROME STEEL WAREHOUSE.

Address JOHN W. QUINCY, Manager, 98 William St., N. Y.

This steel is made from Chromium and Iron, and is remarkable for Strength, Durability and Uniformity. Send for Circular, where the proof will show it does 25 to 75 per cent. more than other cast steel. It is adapted to all kinds of work where cast steel is used. Chrome Steel Castings from 25 to 500 lbs. to order.

Southern Advertisements.

ROANE IRON COMPANY,

Manufacturers of and Dealers in

Pig and Railroad Iron.

CHATTANOOGA, - - - TENN.

S. B. LOWE, Chattanooga, Tenn.,

DEALER IN

PIG IRON IRON ORES AND FURNACE COKE.

LIGHT GRAY IRON CASTINGS

MADE A SPECIALTY BY

TAYLOR & BOGGIS,

65 to 73 Central Way,

CLEVELAND, OHIO.

Having extensive machine shop connected with foundry, we are enabled to fit up all kinds of light Hardware or patented articles. Correspondence solicited.

IRON AND STEEL DROP FORGINGS

All shapes, small and large, including Gun, Pistol, Wrench Bars, &c. Also, Die Sinking. Manufacturers also of Bricklayers', Moulders' and Plasterers' Tools, Saddlers' Round and Head Knives.

WILLIAM ROSE & BROS.,

36th & Filbert Sts., West Philadelphia.

RICHARD P. PIM, Wilmington, Delaware,

MANUFACTURER OF

REFINED AIR FURNACE MALLEABLE IRON, IMPROVED PROCESS,

And LIGHT GRAY IRON CASTINGS. Castings of Best Quality made to order at short notice.

BRITTON IRON AND STEEL CO.,

MANUFACTURERS OF

BOILER, TANK AND BRIDGE PLATES,

Galvanized and Black Sheet Iron.

Foot of Wasson Street, CLEVELAND, OHIO.

JACKSON IRON COMPANY,

Manufacturers of Fayette Pig Iron (L. S. Charcoal), Stewart Pig Iron (Bituminous Coal and Coke), Also, Hammered Blooms, Billets and Muck Bar, extra low in phosphorus, for Siemens Martin and Crucible Steel. Meters of Jackson (Lake Superior) Iron Ores. FAYETTE BROWN, Gen'l Agent. HARVEY H. BROWN, Asst. Gen'l Agent. Offices, 130 Water St.

HARVEY H. BROWN & CO.,

AGENTS

CHAMPION IRON CO., Lake Superior Iron Ores.
LAKE SUPERIOR IRON CO.
Dealers in Pig Iron, Iron Ores and Old Rails.

Offices, 130 Water Street, CLEVELAND, OHIO.

IRON ORES

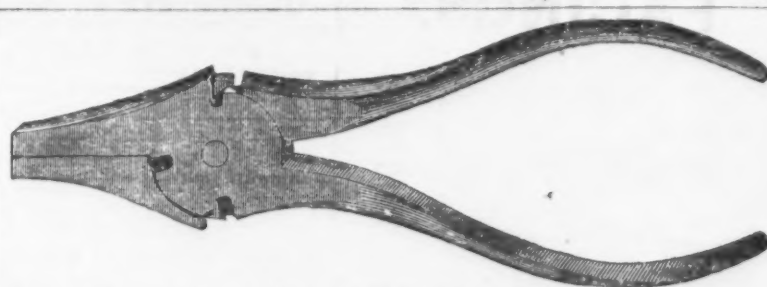
C. E. BINGHAM & CO.,

Agents for the Sale of

Lake Champlain, Lake Superior and

Canada Iron Ores and Pig Iron,

CLEVELAND, - - - OHIO.



J. M. KING & CO.,

WATERFORD, N. Y.

Manufacturers of the BUTTONS PATENT

"WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps, Hand, Nut and Screw Taps, Pipe Taps and Reamers. Price List on application. Established by DANIEL B. KING, 1859.

A. C. NORTHROP,

Waterbury, Conn.,

NOVELTIES IN BRASS AND OTHER METAL GOODS

FOR HARDWARE TRADE.

Wrought Iron and Brass Machine Screws; Turned, Hexagon, Round and Square Head Cap and Set Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass. Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

John Carver,

MANUFACTURER OF

CAULKING IRONS,

Cotton, Freight and Hay Hooks,

No. 44 North Third Street,

Near First,

BROOKLYN, E. D.

CAMPANIL IRON ORE,

SOMORROSTRO MINES.

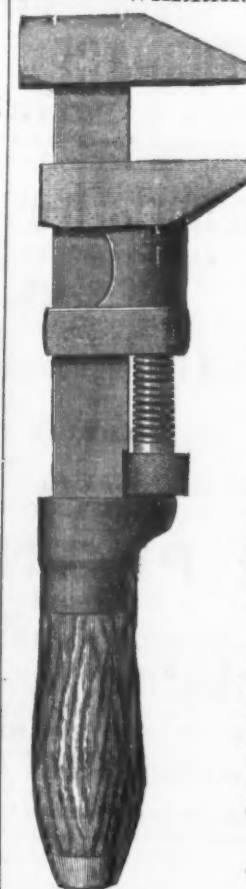
J. LLERA,

15 DEY ST., New York.

P. O. Box 394.

STANDARD GIRARD WRENCH.

WARRANTED.



FOR

STRENGTH

AND

Durability

IT HAS

NO SUPERIOR.

GUARANTEED

IN

EVERY RESPECT.

Wrought Bar, Head

and Screw.

Owing to the in-

creased demand

for these justly

Popular Wrenches,

we are now manu-

facturing more than

any other establish-

ment in the world.

Our Wrench hav-

ing been imitated by

other manufactur-

ers, we have adopt-

ed the above Trade

Mark, and will here-

after stamp all our

goods.

SEND FOR

TERMS AND PRICES.

GIRARD WRENCH MFG. CO., Girard, Pa.

A. Garrison. J. H. Ricketson. Wm. Holmes

PITTSBURGH FOUNDRY.

A. GARRISON & CO.,

Manufacturers of

Chilled Sand and Patent

Homogeneous Steel

ROLLS,

Both Solid and Hollow,

Ore and Clay Pulverizers, Rotary Squeezers,

Haskin's Patent Double Spiral Finings, and Rolling

Mill Castings of every description.

OFFICE, 6 Wood St., - - - PITTSBURGH.

Bridgewater Iron Co.,

Bridgewater, Mass.,

Manufacturers of

SEAMLESS DRAWN

COPPER AND BRASS TUBES,

TACK PLATES,

Forgings of every description.

Bridgewater Iron Co.'s

HORSE NAILS.

PRICE LIST.

Nos. 5 6 7 8 9 10

Per lb. 20¢ 25¢ 28¢ 30¢ 32¢ 35¢

Liberal discounts to the Trade.

73 Pearl Street, New York.

28 Broad Street, Boston.

The Iron-Masters' LABORATORY.

Exclusively for the

Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.

No. 330 Walnut St., Philadelphia.

J. BLODGET BRITTON.

This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ordinary Ore..... \$4.00

For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12.50

For each additional constituent of usual occurrence..... 1.50

For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.

For determining the per cent. of Sulphur or Phosphorus in Iron or Steel..... 7.00

For each additional constituent of usual occurrence..... 5.00

For the per cent. of Carbonate of Lime, and insoluble Silicious Matter in a Limestone..... 2.00

or the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12.50

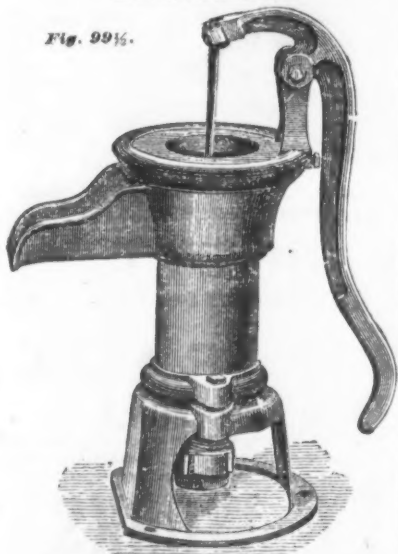
For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will correspond with those for the constituents of an ore.

For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.

Printed instructions for obtaining proper average samples for analysis furnished upon application.

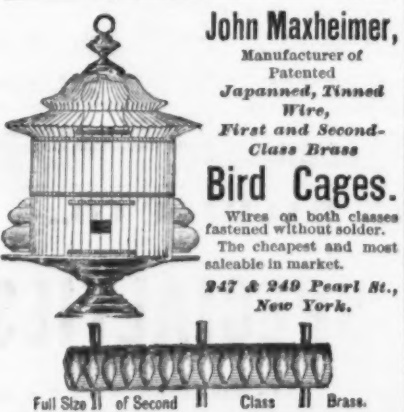
The Largest Pump Works in the World.
OVER 500 DIFFERENT STYLES.
**PUMPS, STEAM PUMPS, ROTARY
PUMPS, CENTRIFUGAL PUMPS,
PISTON PUMPS,**
for Tanners, Paper Mills, Fire Purposes, suitable for
all situations imaginable.

Fig. 99 1/2.



Also, HAND FIRE ENGINES.
Send for Catalogue. Address
RUMSEY & CO.,
Seneca Falls, N. Y., U. S. A.
BRANCH HOUSES: 23 Liberty St., New York, and
105 Lake St., Chicago, Ill.
L. M. RUMSEY & CO., Agents, 81 North Main Street,
St. Louis, Mo. H. R. C. HAWLEY & CO., San Fran-
cisco and Sacramento, Cal. General Agents for the
Pacific Coast. JUSTUS SCHMIDT, Agent, Hamburg.

Gilbert & Bennett Mfg. Co.,
GEORGETOWN, CONN.,
MANUFACTURERS OF
**IRON WIRE, SIEVES AND
WIRE CLOTH.**
Power Loom Painted Screen Wire Cloth,
GILBERT'S RIVAL ASH SIEVE,
Galvanized Twist Wire Netting,
THE UNION METALLIC CLOTHES LINE WIRE,
Warehouse, - 49 Cliff St., New York.



John Maxheimer,
Manufacturer of
Patented
Japanned, Tinned
Wire,
First and Second-
Class Brass
Bird Cages.
Wires on both classes
fastened without solder.
The cheapest and most
saleable in market.
247 & 249 Pearl St.,
New York.

JOHN STARR,
Hardware & Metal Broker,
AND
MANUFACTURERS' AGENT,
Halifax, Nova Scotia,
Representing in the Dominion of Canada several
American Manufacturers, is ready to accept
further Agencies. Satisfactory references.

AXLES
All kinds Wagon & Carriage Axles
Manufactured by the
LAMBERTVILLE IRON WORKS.
Lambertville, N. J. Send for prices.

W. & B. DOUGLAS,

MIDDLETOWN, CONN.,

The Oldest and Most Extensive Manufacturers of

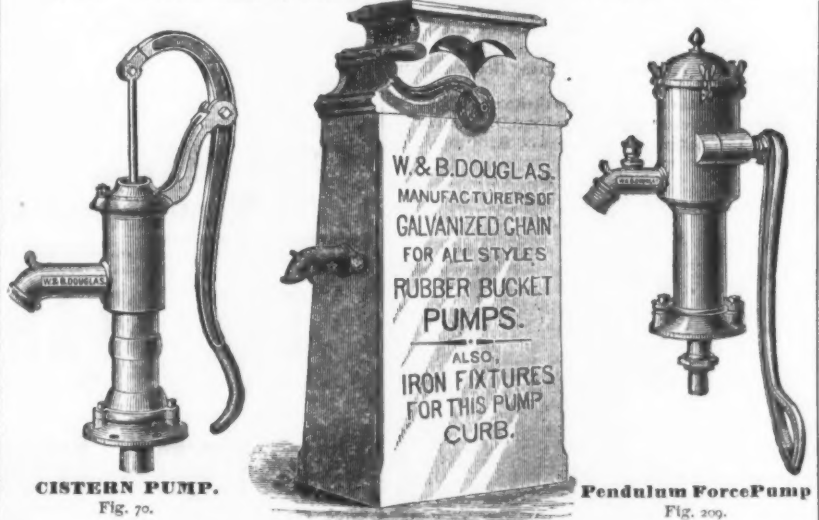
PUMPS, HYDRAULIC RAMS, GARDEN ENGINES

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps
and other Hydraulic Machines in the World.

Awarded two **GRAND MEDALS** at **WORLD'S EXPOSITION**, Paris, France, 1876, being
the highest award on Pumps, &c.; also the highest medals at Paris, 1867, Vienna, 1873, and Philadel-
phia, 1876, accompanied by the Report of Judges.
Descriptive Catalogues and Price Lists sent when requested.

BRANCH WAREHOUSES:

85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.



CISTERN PUMP.
Fig. 70.

Pendulum Force Pump
Fig. 209.

LIGHTNING HAY KNIVES,

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow
and stack, cutting fine feed from bale, cutting corn stalks for feed, cut-
ting peat and ditching marshes.
The blade is best cast steel, spring temper, easily sharpened, and is
giving universal satisfaction. A few moments' trial will show its merits,
and parties once using it are unwilling to do without it. Its sales are
fast increasing for exports as well as home trade, and it seems destined
to take the place of all other Hay Knives.
They are nicely packed in boxes, one dozen each, of 50 pounds weight,
suitable for shipping by land or water to any part of the world.

MANUFACTURED ONLY BY

HIRAM HOLT & CO.,

East Wilton, Franklin Co., Maine.

For sale by the Hardware Trade generally.

TACKS AND NAILS.



CUT TACKS, SHOE NAILS, WIRE NAILS,

Pat. Brads, Finishing Nails, Clout Nails, Trunk Nails, Hungarian Nails,
Cigar-Box Nails, Basket Nails, 2d and 3d Fine Nails.

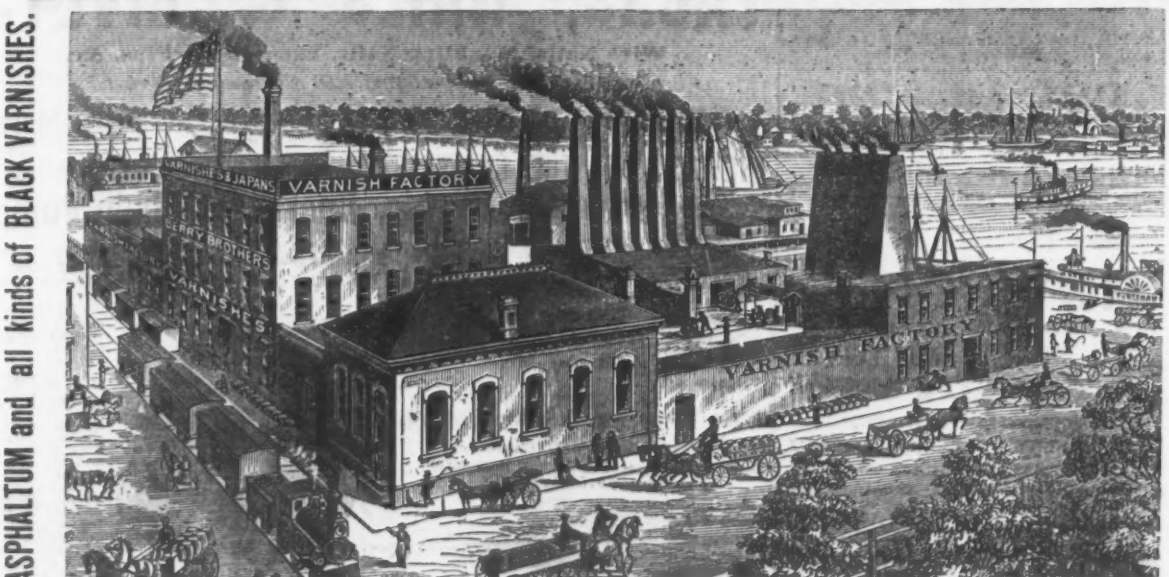
Carpet Tacks, Upholsterers' Tacks, Glimp and Lace Tacks,
Brush Tacks, Copper and Brass Tacks,
BRASS AND IRON ESCUTCHEON PINS, &c., &c.,

MANUFACTURED BY

DUNBAR, HOBART & WHIDDEN, So. Abington Station, Mass.
New York Salesroom, 39 Warren St. Goods made to order from sample.
Particular attention given to orders for EXPORT.

ESTABLISHED 1858.

BLACK and BROWN BAKING JAPANS.



BERRY BROTHERS, Varnish Manufacturers, Detroit, Mich.
CHICAGO BRANCH, 236 Lake St.; ST. LOUIS, 301 & 303 North Third St.; CINCINNATI, 72 Main St.; ROCHESTER, 115 Front St.; BALTIMORE, 103
West Lombard St.; PHILADELPHIA, 57 North Front St.; BOSTON, 141 Milk St.; NEW YORK, 273 Broadway.

landed and caused the fog horn to be put in
action, and turned to a fixed note for con-
venience of adjustment, and then proceeded
in the Mistletoe to various distances from
the shore, and made numerous experiments
to determine how closely a person seated in
the cabin could turn the apparatus so as to
indicate the true direction of the sound. It
was thus shown that any one, by simply
turning until the least sound was perceived,
would bring the pointer to within 10 degrees
or less than one point, of the true direction.
This accuracy was, of course, all that was
requisite in the practical use of the appa-
ratus. On the following day they again went
in the Mistletoe to Eaton's Neck, on Long
Island, where they repeated the same experi-
ments with like results, finding that, at dis-
tances of from four to six miles, it was easy
to determine the direction of the horn from
the vessel to within one point. In the course
of these experiments, certain improvements
in detail suggested themselves, and these
have been embodied in a new apparatus
constructed by Mr. French, with which Pro-
fessor Mayer has been making further ex-
periments, with a view of perfecting all the
details.

Buildings and Engine Foundations for Water Works.

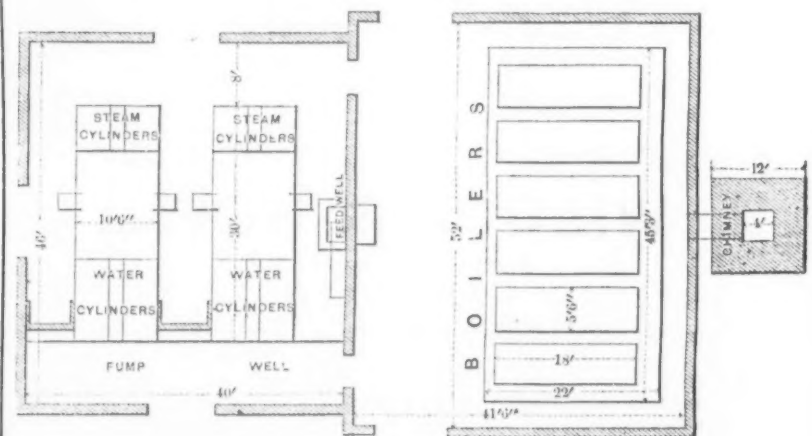
The question of what system of water
works shall be adopted is one which is of
special importance in small towns, where
the people can ill afford to expend a single
dollar uselessly. In the matter of compar-
ing the merits of different systems, town
committees, very unfortunately, have little
or nothing to guide them in reaching a con-
clusion. One of the first points which an
engineer looks after is the cost of the foun-
dations for engines, boilers, &c. No com-

level of the floor, does not tax the engine-
house for support of any kind. It only re-
quires protection, combined with enough
attention to architecture, to meet the re-
quirements of good taste and permanent
construction. But for these and the danger
of fire, the simple wooden building under
which several of the largest of these engines
have been called upon to labor until perma-
nent structures could be provided, would
have answered indefinitely.

The air chamber, which is the only ele-
vated appendage to the engine, never
reaches so high as to demand a loftier roof
than is indicated by architectural propriety.
An engine of 10,000,000 gallons in 24 hours
capacity can be accommodated in a room of
50 by 23 feet interior dimensions, and a
height to the eaves of 16 feet. Extended to
50 feet square, it would accommodate two
such engines liberally. An engine of 3,000,-
000 gallons capacity would need a room of
25 by 35 feet. The same engine in dupli-
cate would require 35 by 40 feet. For in-
termediate sizes these dimensions may be
qualified about in proportion.

The engraving presents the plan of
boiler and engine house of one of the
Baltimore pumping stations, containing
two 5,000,000 engines and six return
tubular boilers. The allotment of space
is little enough, but by no means in-
convenient. It is sometimes considered
desirable to provide for the storage of coal
within the boiler room. But a contiguous
shed for that especial purpose generally
saves in construction, and removes the dust
and dirt from the immediate neighborhood
of the machinery.

The pump well—so marked in the en-
graving—is a watertight receptacle beneath
the floor of the engine room, into which the
supply pipe for the pump is carried. Prac-
tice proves that it is very desirable to have



Buildings for Water Works.—Plan of Engine and Boiler Houses.

parison of cost between rival engines can be
considered complete that does not involve
the cost of the peculiar buildings and foun-
dations required by each variety. It would
not be difficult to exhibit cases where the
expense of foundations alone were nearly, if
not quite, equal to the contract price of the
engine.

In considering the question of the extent
and massiveness of mason work required, it
will be noticed as a valuable peculiarity of
the direct-acting steam pumps, whether in-
tended to work high or low pressure, that
their power is nearly all exerted in a direct
line, with little or no tendency to make
oblique pressure in any direction.

Their working efforts are contained within
the frame which tie their parts together,
and scarcely tax the bed upon which they
are laid, except to support the weight. But
for the thrust produced by the water in the
delivering main, a holding-down bolt would
hardly be required. In fact, such engines
have often been temporarily run without
being fastened in any way.

In slight qualification of these remarks, it
will be observed that, in cases where air
pumps are driven from the main cross-
head by a bell crank or by links through a
lever, the motion of the air pumps is indi-
rect; but the power expended upon them is
not enough in amount to make sensible dif-
ference, and practically the whole force of
the engine is expended directly in line with
the connecting bars. The only tendency to
disturbance that needs to be guarded against
arises either from the settlement or com-
pression of the mason work, the lateral thrust
of the forcing main, before adverted to, or
the expansion of the engine when heating
up, all of which is easily met.

It may be said, in general terms, that a
block of masonry 8 feet deep, built upon re-
liable ground, is sufficient for the foundation
of the largest of this style of engine yet
erected. In general this block of masonry
is built of about the same length and width
as the steam cylinders. If the air pump and
condenser are set below the engine and the
former is driven from the main piston
rods, the center of the block will be largely
cut away. When an independent condenser
and air pump are used, as is common in all
the smaller engines, the block of masonry is
solid. The upper side is about one foot above
the level of the engine-room floor, and the
holding-down bolts pierce the block from
top to bottom.

Brick laid in cement is the material gen-
erally selected, as being easy to procure and
more readily laid to exact dimensions, with
suitable pockets for the foundation bolts.
But stone is often, and in some cases ad-
vantageously, substituted.

These foundations are so simple in shape
as to be readily built by any good mason,
and so compact and low down as to make it
easy to place the heavy parts of the engine
upon them. It is not possible to make an
accurate statement of cost except for speci-
fied localities, on account of large local dif-
ferences in the prices of labor and material.
But \$2000 may be taken as the outside cost
of foundations for an engine not exceeding
6,000,000 gallons per day capacity. This is
a quantity of water two-thirds larger than
is needed by a city as large as Rochester,
N. Y.

As regards the buildings required, it is
plain to see that an engine of the kind de-
scribed, resting upon mason work at the

a well of this kind, so constructed that it
can be conveniently emptied, when neces-
sary, for inspection or repairs of the foot
valve or supply pipe. In contrast with a
long pipe, through which the pump is re-
quired to draw water from an adjoining
lake or river, it is very much to be pre-
ferred. For many reasons, based upon the
peculiar action of pumps upon the water
column, a long supply pipe should be avoided,
especially if any considerable vacuum is to
be maintained. The examples frequently
occurring prove the truth of this state-
ment. When the water is brought by con-
duit to a pump well, from which a short
supply pipe, provided with a proper foot
valve, is led to the pumps, a lift by ex-
haustion of 21 feet, measuring from the sur-
face of the water to the center of the pump,
is not practically objectionable. Yet there
is no point more clearly established by the
workings of large pumping engines than
that the water should be brought to the
pumps as nearly on a level with the lower
valves as it can be conveniently. Every
foot of lift saved is worth something to the
engine in a practical point of view. The
ability to produce a vacuum is easily im-
paired by a leak or derangement of the
water valves, and this failure always pro-
duces concussion and sometimes fracture,
by allowing the piston to travel without
resistance, for a portion of its stroke, until
suddenly arrested by the water, upon which
it impinges with a hurtful blow.

Pumping engines are sometimes required
to work under a head of supply. This is a
somewhat difficult requisition, but with due
care it can be successfully met in practice.

As no pump can act efficiently to free
itself from the air contained within its
chambers at starting so long as pressure
exists upon the delivery valve, a secondary
delivery pipe or "by pass" should be pro-
vided, to be opened when the gate or check
valve upon the main delivery is closed. The
pumps can then be moved slowly, under
little or no pressure, until thoroughly
emptied of air and filled with water. At
the same time the steam cylinders will be
properly heated, the vacuum established,
and everything brought in order for taking
up the full work. The "feed well" is a
small tank, designed to receive enough of
hot water from the steam jackets and air
pumps for the supply of the boilers.

Usually the feed pumps are only attached
to the smaller engines, their place being
taken by an independent feeding apparatus,
arranged to pump hot or cold water, or
to charge the pump cylinders, if so re-
quired. This last provision obviates the
necessity of starting on a dry pump, which
sometimes allows the engine to jump
badly before catching the water upon which
it depends for a suitable resistance. Even
with the smallest engine, having a capacity
of only 500 or 600 gallons per minute, an
independent pump that can be worked by
hand is very desirable for feeding the boiler.
These cost so little that they are hardly
worth taking into account in estimating the
cost of water works.

A good example of the mobility of labor
under the stimulus of too low wages, is found
in the fact that recently all but four of the
trackmen in the Pennsylvania Railroad
yards, at Pittsburgh, threw up their situa-
tions to work in the mills, thereby receiving
increased compensation.

AUBURN FILE WORKS,

Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
89 Chambers and 71 Reade Streets, N. Y.

Paris, 1878.

**McCAFFREY & BRO.,**

PENNSYLVANIA FILE WORKS,

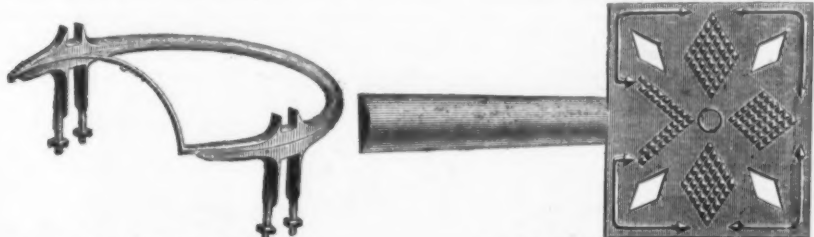
Philadelphia, Pa., U. S.

For Superiority.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.



Derby No. 2, Fifth Wheel. The most popular wheel in the market.

New Diamond Step. Forged from Norway iron bars.

WILCOX & HOWE,

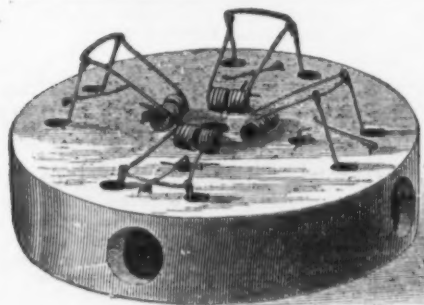
Birmingham, Conn.,

MANUFACTURERS OF

First-Class Carriage Forgings, Fifth Wheels, Steps, Body Loops, Stay Ends.

Offsets, Long Joint Ends, &c., &c.

Our Illustrated Catalogue furnished to the trade.



"Common Sense"

MOUSE TRAPS,

For Home and Export Trade.

BEST IN MARKET.

RIPLEY MFG. CO

Unionville, Ct., U. S. A.,

Manufacturers of

Lemon Squeezers, Mallets, Rosewood
Faucets, Patent Boot Jacks, and
Housefurnishing Ware.

THE E. D. CLAPP MFG. CO.,

Successors to HAYDEN & SMITH,

AUBURN, N. Y.

MANUFACTURERS OF

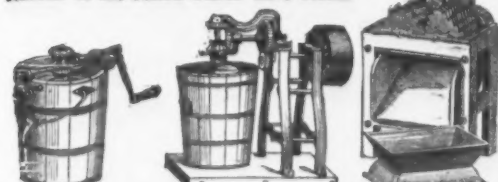
EVERY DESCRIPTION OF

CARRIAGE HARDWARE.



SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice
crushers, being the only firm in the United States who manufacture all parts of the raw material. The
Examining Committee, consisting of 50,000
citizens of the United States have recom-



HAND FREEZER. 2 to 2 1/2 qts.
\$3.50 to \$5.00.

HAND OR POWER. 25 and 40 qts.
\$75.00 and \$125.00.

HAND OR POWER. ICE CRUSHER.
\$75.00.

White Mountain Freezer Co.,

Laconia, N. H., U. S. A.

SPECIAL ATTENTION GIVEN TO EXPORT ORDERS.

C. F. MOORMAN, Pres. J. MORGAN COLEMAN, V. Pres. L. G. QUIGLEY, Sec. and Treas.

COLEMAN ROLLING MILL CO.,

Lessees Louisville Rolling Mill,

MANUFACTURERS OF

BAR, BAND & SHEET IRON

T and Tram Railroad Iron, 10 lbs. to 40 lbs. per yard, and
AN & COLEMAN PATENT RAIL.
Office, No. 45 W. Main St., Mill Brook St.,
LOUISVILLE, KY.

FILES & RASPS,

Established 1868.

Best Cast Steel.

HAND-CUT. Manufactured by
JOHNSON & BRO.
No. 1 Commercial Street, Newark, N. J.

SPENCER & UNDERHILL,
94 Chambers St., New York, Agents for

American Screw Co.'s Wood Machine and
Rail Screws, Stove and Tire Bolts, Rivets, &c.
G. F. Warner & Co.'s Carriage Clamps.

DEPOT FOR

O. Ames & Son's Shovels, Spades and Scoops.
A. Field & Son's Tacks, Brads, Nails, &c.
Nicholson File Co.'s Files and Rasps.
W. & S. Butcher's Chisels, Gouges, Plane
Irons and Cleavers.
E. W. Gilmore & Co.'s Strap and T Hinges.
Russell Jennings' Auger and Dowel Bits.
Also a general assortment of Hardware.



THE GIANT PAD LOCK.

Manufactured by

THE SMITH & EGGE MFG. CO.

(Centennial Award.)

"Superior in Every Respect."

This is one of the best selling Locks in the market,
and affords the dealer a large profit. It is thoroughly
and strongly made—of the best material—very hand-
some in appearance, and every Lock is warranted.
Orders solicited. Address as above
Lock Box 1705, Bridgeport, Conn.

PRIZE MEDALLISTS:

Exhibitions of 1862, 1864, 1867, 1872, 1873, and only
award and medal for Noiseless Steel Shutters at
Philadelphia, 1876, and Paris, 1878.

CLARK & CO.,

Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

ALSO IMPROVED

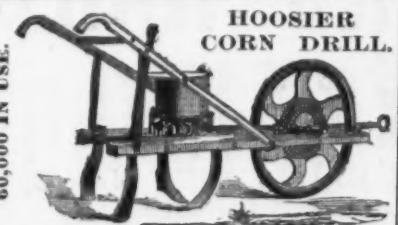
Rolling Wood Shutters

Of various kinds. Endorsed by the Lead-
ing Architects of the World.

Send for Catalogue.

Office and Manufactory,

162 & 164 West 27th St., N. Y.



60,000 IN USE.
Drops, with great regularity, one grain in a place,
either 12, 16 or 20 inches apart, does the covering
uniform in depth and is both time and labor saving. It
gives to each stalk its full share of plant food, by
which the quality is improved and the yield increased
from 10 to 20 bushels per acre over hilled corn, hence
it is a splendid selling implement. Agents wanted in
unoccupied territory. Send for circular.

Hoosier Drill Co., Richmond, Ind.



THE "EDDY" STRAIGHTWAY VALVES.

ALSO,

FIRE HYDRANTS.

Axe, Hatchet, Powder and

Brush Machinery.

MOHAWK & HUDSON MFG. CO.,

WATERFORD, N. Y.

BENTON, FAULKNER & BIRD, N. Y. Agents.

PANCOAST & MAULE, Phila. Agents.

R. COOK & SONS,

Manufacturers of

Carriage & Wagon AXLES.

WINSTED, CONN.

ESTABLISHED 1839.

HOWSONS'

OFFICES FOR PROCURING

UNITED STATES AND FOREIGN PATENTS,

Forrest Buildings,

19 SOUTH FOURTH ST., PHILADELPHIA,

AND MARBLE BUILDINGS

605 Seventh St., (Opposite U. S. Patent Office),

Washington, D. C.

H. HOWSON, Solicitor of Patents. C. HOWSON, Attorney at Law.

Communications should be addressed to the

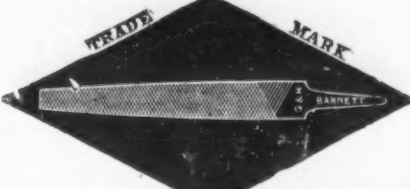
PRINCIPAL OFFICES, PHILADELPHIA.

PATENTS.

THOMAS D. STETSON, 23 Murray St., N. Y.,

Patent Solicitor and Expert.

Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for
"VERY SUPERIOR GOODS."

G. & H. BARNETT

39, 41 & 43 Richmond St., Philadelphia.

CHARLES B. PAUL,

Manufacturer of HAND CUT FILES.

Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.
All descriptions of Files made to order. Price List mailed on application. Established 1863.

THE STANLEY WORKS,

MANUFACTURERS OF

Wrought Iron Butts, Hinges

AND

DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

FACTORIES:

WAREHOUSE:

New Britain, Connecticut.

79 Chambers St., New York.

GRAHAM & HAINES,

P. O. Box 1040.

113 Chambers and 95 Reade Streets, New York.

HARDWARE MANUFACTURERS' AGENTS, as follows:

Lawrence Curry Comb Co.,
Curry Combs.
Howard Bros. & Co.,
Cotton, Wool and Curry Cards
Thompson, Derby & Co.,
Scythe Snaths.
Osteo Fork Mills.
Steel Forks, Rakes, Hoes, &c.
H. Knickerbocker,
Scythes, Axes and Tools.
H. W. Kipp, Nail Hammer.
Kloman, Park & Co., Vises,
Picks, Mattocks, Grub Hoes, &c.
Jacobus & Nimick Mfg. Co.,
Locks, &c.
Sandusky Tool Co.,
Planes and Planes' cons.
Geo. M. Eddy & Co.,
Measuring Tapes.
Wheeling Hinge Co.,
Hinges and Wrought Butts.
Northwestern Horse Nail Co.,
Horse Nails.
A. G. Coe & Co.,
Coe's Genuine Screw Wrenches.
F. K. Stuby, Emery Cloth.
Holroyd & Co., Stocks & Dies.
Sedgwick Mfg. Co.,
Butter and Flour Triers, etc.
Ripley Mfg. Co., Mouse Traps.
Sam'l Loring,
Plymouth Tack & Rivet Works.
Carr, Crassey & Deelin,
Miscellaneous Hardware & Cast
Butts.
J. Mallinson,
Cast Steel Shears and Scissors.
Ketchum's Pat. Metallic Sieves.

THE AMERICAN MACHINE CO.,

Manufacturers of

HARDWARE SPECIALTIES.

Office and Factory:

Branch House:

No. 1916 to 1924 North 4th St., Philadelphia.

No. 128 Chambers St., New York.

SPECIALTIES: Fluting Machines, Hand Fluters, Fluting Machines, Christmas Tree Holders,
Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, &c., &c.

Morse Twist Drill and Machine Co.,

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.

BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill

Presses. Beach's Patent Self-Centering Chucks, Center

and Adjustable Drill Chucks, Solid and Shell Reamers.

Drill Grinding Machines. Taper Reamers, Mill-

ing Cutters and Special tools to order.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt.

EDWARD S. TABER, Treas.



TACKS, NAILS & RIVETS.

Wire Nails, Moulding Nails, Escutcheon Pins, &c.

New York Salesroom, 116 Chambers Street.

AMERICAN TACK CO., Fairhaven, Mass.

THE BEST ARE THE CHEAPEST



STANDARD

SCROLL

SAWS,

Warranted the

Most Accurate

and Durable.

Dexter.

The Trump Lathe Chucks,

Three Jaws, Self-Centering.

Equal to the best. For drills 1/2 and under.

Price, \$1.50 to \$2.25.



Trump Bros. Machine Co.,

Wilmington, Del., U. S. A.

Send for circulars.

The Most Durable and Best Selling

Bucket for Chain Pumps.

It has no valves to become obstructed and no
screw joints to become immovable by rust.

Advantages of the Crosby Bucket over all

others:

1. It has an air chamber on top which conducts the air to the bottom of the well.
2. It is self-expanding, the base of the bucket being 1/2 of an inch larger at bottom than core in the tubes, which allows it to expand, and the groove in the side to contract.
3. The wear comes on the whole side, and not on the extreme edge like other buckets.
4. It contains more solid rubber than three of any other manufacture.

No charge for territorial rights. Send for Price
List. Agents wanted in every county. Address
A. D. CROSBY, Patentee and General Agent,
Cuba, Allegany Co., New York.

A. FIELD & SONS,

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH WIRE NAILS, TACKS, SHOE NAILS, And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.



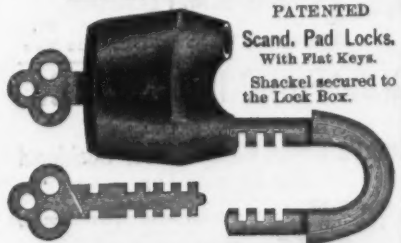
WM. R. HARTIGAN, Burlington, Ct.,
Manufacturer of all kinds of
Tool Handles & Seat Sticks for Carriages, &c.
Also all kinds of ENAMELED GOODS MADE OF WOOD, such as
DROP KNOBS, FURNITURE KNOBS, ORGAN STOPS, BRUSH HANDLES, &c., &c.
Also sole manufacturer of the
PATENT ANTI-NEUROUS TRIANGULAR PENHOLDER.
Send for Catalogue and Price List before purchasing.
Manufacture at **F. R. EMMONS, Agent,**
BURLINGTON, Conn., U. S. A. 55 Warren St., New York.

Hoisting Machinery
MANUFACTURED BY
CRANE BROTHERS MFG. CO.,
Chicago.

STAR LOCK WORKS.

ESTABLISHED 1836.

Trunk Locks, Door Springs,
Pad Locks, Trunk Stays,
Dead Latches, Keys, &c., &c.
110 South 8th St., and Sansom, bet. 8th
and 9th, PHILADELPHIA.



HILLEBRAND & WOLF.

CLOTHES WRINGERS.



T. J. ALEXANDER, Manager,
BOSTON, MASS.

ALWAYS ASK FOR
ESTERBROOK'S



Steel Pens.

THE MOST POPULAR PENS IN USE.

For Sale by all Stationers.

ESTERBROOK STEEL PEN CO.,
Works, Camden, N. J., New York.

THE ANSONIA CORRUGATED STOVE PLATFORM.
With Patented O. C. Border.

ROUND ZINC.

27, 30, 32, 34, 36 inch.

Manufactured of heavy metal, requiring
no nailing or lining, the edge retaining its
form. Superior pattern, finish and quality.
Price as low as any.

Send for List and Discount.
Packed 12 in each case.



Cut Showing Round Platform.

THE ANSONIA STOVE REST.



This Cut is the Actual Size of 2-inch.

STOVE RESTS are designed to
place under the feet of Stoves
and Ranges, for the purpose of
raising them from the floor or
platform. They are about 1/2-
inch thick, covered with sheet
metal in zinc, brass and nickel
plate. Highly polished and fin-
ished. Packed one set of 4 pieces
in each paper box, and 36 sets in
each case. Sizes (inside of circle
on top)

2, 2 1/2, 2 3/4, 3 1/4 inch.
Send for full Description
and Prices.

ANSONIA BRASS AND COPPER CO., 19 Cliff St., New York.

WROUGHT IRON FENCE,

OUR SPECIALTY. Also Crestings, Finials and Vanes; Stable Fixtures, Hitch-
ing Posts, Door and Window Guards, Wrought Iron Gratings, &c. Address
Cleveland Wrought Iron Fence Works, J. H. Van Dorn, Proprietor,
CLEVELAND, OHIO, U. S. A.,

RICHARD DUDGEON,

No. 24 Columbia Street, New York,

Maker and Patentee of the Improved

Hydraulic Jacks

AND
Punches.



Roller Tube Expanders and Direct Acting Steam Hammers.
Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.



EVERY
PUTNAM NAIL
is drawn down to a point from the rod, thus:

It is the only Hot Forged and Hammer Pointed Horse Shoe Nail, made by ma-
chinery, in the World.

Some other manufacturers claim to make a hot forged Nail, but you will observe on all such a
sheared edge near the point.

P. O. Address, Neponset, Mass., U. S. A.,

THE PUTNAM NAIL CO., Boston.

New Pressure Regulating Valve.

Messrs. Handren & Robins, 126 Washing-
ton street, New York city, have recently
brought out an improvement in pressure
regulating valves, or, rather, a new regulat-
ing valve, which in itself contains one of the
most valuable improvements in diaphragms
which has been put on the market for many
years. Every engineer, whether he be con-
nected with the use of water, gas, steam or
air under pressure, knows how valuable a
good diaphragm would be, and how very
nearly worthless those in common use are,
in all save exceptional cases. In their use
we have their stiffness when of metal, their
weakness when of other substances, their
perishable nature when heated and their
general uncertainty, as some of the great
objections to them. The materials most
commonly used are rubber, leather, canvas
and spring steel; the latter is employed in
very fine pressure gauges, and for this pur-
pose can be made to meet every require-

gas, liquid or vapor can be taken at any pres-
sure and delivered at any desired lower
pressure. The shield, as shown in Fig. 1, con-
sists of a frame G G, having an octagonal
depression in the center, upon the edges of
which eight V-shaped levers (E E) rest, with
their points toward the nut or abutment F.
These levers have clearance enough between
them to allow considerable vertical motion
in the nut F without binding. Upon this
flanged bottom piece G the copper is laid like
a large gasket, and the stem of the valve is
screwed down upon the nut F, as shown in
Fig. 2. The bolt holes seen in Fig. 1 are
those which hold the bottom plate up to the
flange upon the valve case. Each of the
V-shaped levers has three small projections
upon either side upon which it rests, and is
always sure of finding a firm bearing.

The action of the valve is very simple.
The full pressure of steam upon one side of
a valve tending to open it is resisted by a
low pressure upon the other side, which acts
upon a much larger surface. Thus the steam

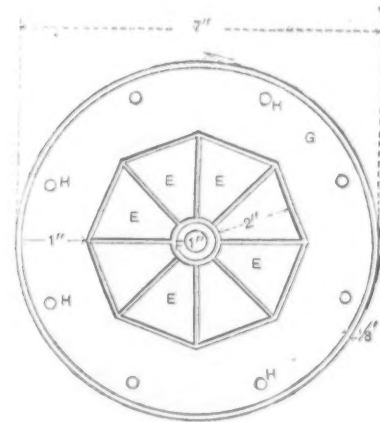


Fig. 1.—Plan of Valve, showing Method of Supporting Diaphragm.

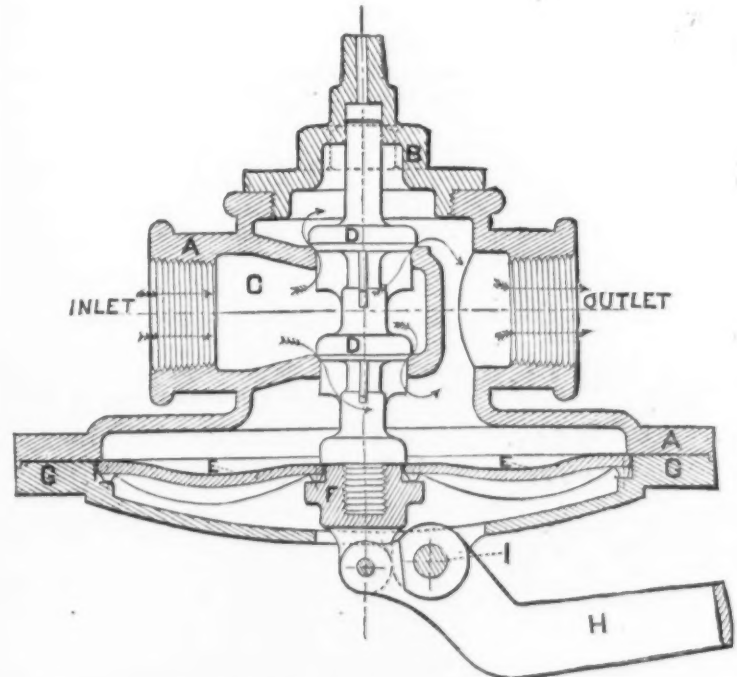


Fig. 2.—Section through Outlet and Inlet Pipes, showing Lever and the Course of the Steam.

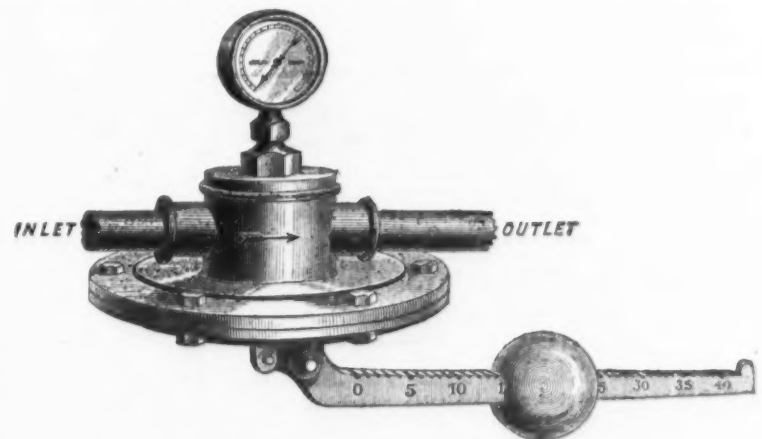


Fig. 3.—Elevation of Valve in Position.

NEW PRESSURE REDUCING VALVE.—BY HANDREN & ROBINS.

ment. The rubber is mostly used in the var-
ious kinds of apparatus for controlling the
dampers of boilers by means of steam or
water pressure. Although the difficulty of
getting a good steel for a diaphragm, and of
properly handling it so that its elasticity
shall be uniform and permanent in use, is
very great, a few makers have been able to
do this with marked success.

The improvement introduced by Messrs.
Handren & Robins, which is applicable on a
large scale for a variety of purposes, con-
sists of making the diaphragm itself of thin,
soft copper. This is so flexible that its resis-
tance to the motion is not appreciable.
To enable it to stand the pressure, it is sup-
ported from the back at all points by a sort
of flexible shield or armor, which takes all
the strain, leaving the flexible metal nothing
to do beyond keeping the joints of the armor
tight. As the distance between the differ-
ent pieces is not more than a sixty-
fourth part of an inch when at the point of
the greatest travel, the strain upon the cop-
per, which is commonly used for the dia-
phragm, is quite insignificant.

Our illustrations show the construction quite
plainly. Fig. 1 represents the shield or armor
on which the diaphragm rests, as seen from
above. Fig. 2 is a longitudinal section, and
Fig. 3 an elevation of the valve to which this
improvement is applied. The valve can be
used for either water, steam, air or gas
under pressure, and is arranged so that the

in the pipe C tends to lift the valve D D,
Fig. 2, but this is resisted by the low pres-
sure steam on the other side of the valve
tending to force the diaphragm E E down
and thus close the valve D D. If an extra
amount of steam by any means passes the
valve, the pressure upon the diaphragm in-
creases, closing the valve entirely until the
pressure reaches its proper limit. The action
is the same with compressed air, gas or
water. With the latter, however, it is ne-
cessary, on account of its incompressible
nature, to use a small drip cock, otherwise
the pressure on the outlet side may, at
times, just after the sudden closing of a
large cock, or in the morning, be much
higher than is desired.

In this new reducing valve steam is ad-
mitted through a double-beat poppet valve,
in which the upper seat is considerably
larger than the lower, and, consequently,
with steam pressure between the seats, has
some little force, tending to raise of its own
accord; of course, if it were accurately bal-
anced, there would be no tendency for the
steam to lift it. Steam passes into the out-
let side of the case, as shown by the direc-
tion of the arrows in Fig. 2, presses down
upon the diaphragm E E, the area of which
is so great that when the steam pressure on
it is one-quarter of a pound per square inch,
it pulls the valve down with sufficient force
to keep it closed against a steam pressure on
the other side of 75 pounds per square inch.

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of
PEN AND POCKET CUTLERY,
Solid Steel Scissors, Shears, Razors, &c.
Sole proprietors of the renowned full concave
"ELECTRIC RAZORS,"
And the celebrated "ELECTRIC SHEARS." Nickel Plated
Hows.
Agents for the BENGAL RAZORS.
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.
91 Chambers and 73 Rouse Sts., N. Y. 423 N. Fifth St., ST. LOUIS, Mo.

MERIDEN CUTLERY COMPANY.

THE "PATENT IVORY" HANDLE TABLE KNIFE.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE
for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE,
BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application.
SALESROOM, No. 49 Chambers St., N. Y. Address all communications to West Meriden, Conn.

THE
LAMSON & GOODNOW
88
CHAMBERS ST.
MFG. CO.
N.Y.
AMERICAN TABLE
CUTLERY & C.

AARON BURKINSHAW,

Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.

Established 1853.

My Blades are forged by hand from the best Cast Steel, and warranted. To me was awarded the Gold Medal of the Conn. State Agricultural Society.

The Celebrated VICTOR Cast Shear

SOLD EVERYWHERE AT THE LOWEST PRICES.

Where Special Attention given to orders for export.

Manufactured only by THE KENZ HARDWARE CO.

BRIDGEPORT, CONN. U.S.A.

Fine Gray Iron Castings.

Fine Plain and Ornamental Metal Patterns made to order at our new foundry, Knowlton St., E. D. Address

THE RENZ HARDWARE CO.,

Bridgeport, Conn.

JOHN WILSON'S CELEBRATED

TRADE MARK.

FOUR PEPPERCORNS AND A DIAMOND.
GRANTED A D 1766 BY THE
CORPORATION OF CUTLERS OF SHEFFIELD
AND PROTECTED BY ACT OF PARLIAMENT
REGISTERED ALSO AT
WASHINGTON U.S.A. ACCORDING TO ACT OF
CONGRESS
ALSO AT LEIPZIG, IN
ACCORDANCE WITH THE GERMAN TRADE
MARKS REGISTRATION ACT.

WORKS:—SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

BUTCHERS' KNIVES,
BUTCHERS' STEELS,
AND
SHOE KNIVES.

It having come to the knowledge of
JOHN WILSON that Counterfeit Butchers'
Knives, purporting to be of his manufacture,
are being sold in the United States, he hereby
cautions all purchasers of his Knives and
Steels to be on the alert against such im-
position.

JOHN WILSON also hereby gives Notice,
that it is his determination to institute Legal
Proceedings against any person or persons who
may be detected infringing his Trade Mark.

Every article of JOHN WILSON'S manu-
facture, bears the Trade Mark, in addition to
the Name.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,

PLANE IRONS.

Gauges of all lengths and circles beveled inside and outside. Nail Sets, Scratch and Belt Awns, Chisel Handles. A full stock of Tools of best quality.

THE
DEXTER
CARRIAGE SPRING

Combines It is
Streight, Graceful,
Durability, Noiseless,
Beauty, Light and Easy.

DEXTER SPRING CO., Hulton, near Pittsburgh, Pa., U. S. A.

The DEXTER SPRING is the most
perfect Carriage Spring ever invented.
Wherever it is known it is rapidly superseding
all others for pleasure vehicles. It is
especially recommended for use on the rough
roads of new countries, as its peculiar con-
struction relieves the strain on the vehicle
and shock to the passenger, while the high
grade of material used reduces the proba-
bility of breakage to a minimum.
For circulars, prices, &c., address

Iron and Brass Wood Screws.

We manufacture a full line of
IRON AND BRASS SCREWS.

Quality, finish and tests as to strength, guaranteed equal to any
in the market.
With improved facilities and largely increased capacity for
production, we can fill orders promptly, and invite inquiries for
discounts.

Philadelphia Screw Co., Limited,
Twelfth and Buttonwood Streets,
PHILADELPHIA.

Cutlery.

ALFRED H. HILDICK,

12 Warren St., N. Y.,

Importer of CHAINS, ANVILS, VISES, &c.

Agency of

HILL BROTHERS & CO., WALSALL, ENGLAND

GENERAL HARDWARE MERCHANTS,

And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, dura-

bility and utility. They are made of one solid piece

of steel from point to point, and cannot be broken in

use either in the bow or at the junction of the shank

and blade. Samples can be seen at above address, or

sample lots furnished.

CORPORATE MARK.



Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

P. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons'

productions having considerably increased, they

have, in order to meet it, greatly extended their

Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers

& Sons' Manufacture, please to see that they bear

their Corporate Mark.

P. O. Box 3962.

ESTABLISHED 1836.

Alfred Field & Co.,

COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

Guns and Pocket Cutlery,

SPECIALTIES.

Headquarters for

ELEY'S BROS. GOODS, WRIGHT'S ANVILS,

WILSON'S BUTCHER KNIVES, &c.

WOSTENHOLM'S POCKET CUTLERY AND RAZORS.

BUTCHER'S FILES, TOOLS AND RAZORS.

STUBS' FILES, WESTERN FILES,

GREAVES' SHEEP SHEARS,

CHESTERMAN'S TAPES,

GERMAN CO. AND HALTERS and other CHAINS.

BRADEN'S TROWELS AND HOES,

CANASTOTA KNIFE CO.'S POCKET KNIVES.

Etc., Etc., Etc., Etc.

All sorts of Hardware and Merchandise for im-

port and export purchased on commission.

ROBERT SORBY & SONS,

SHEFFIELD,

MANUFACTURERS OF THE CELEBRATED

Kangaroo Sheep Shears,

The best

Shears

made.

CORPORATE MARK.

Every

Shears

Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

CORPORATE MARK.

The best

Shears

made.

CORPORATE MARK.

Every

Shears

Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

CORPORATE MARK.

The best

Shears

made.

CORPORATE MARK.

Every

Shears

Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

CORPORATE MARK.

The best

Shears

made.

CORPORATE MARK.

Every

Shears

Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

Cutlery.

McCOY & CO.,

IMPORTERS OF

Hardware, Cutlery, &c.

SOLE AGENTS FOR

THEILE & QUACK'S

CELEBRATED

Pocket Knives and
Scissors.

A large stock of

Muzzle & Breech Loading

English Guns.

132 DUANE ST.,

NEW YORK.

Silver Medal, 1878—Paris.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

WM. ROGERS & SON, AA,

MANUFACTURERS OF

Cutlery and Silver Plated Table Ware.

KNIVES, FORKS, SPOONS, LADLES, CASTERS, BUTTER DISHES.



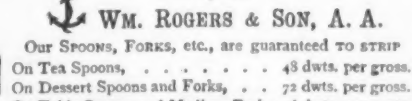
WM. ROGERS,
Senior Member and Manager of ROGERS BROTHERS.
On Knives.



F. WILLSON ROGERS,
Son of the late Wm. Rogers.
On Hollow Ware.



Our Knives are guaranteed to STRIP
12 dwts. of Silver per Dozen.
All goods are put up ONE DOZEN IN A BOX.
All our Knives are put up in the latest
and most attractive style, with guarantee
card in every box.



Our Spoons, Forks, etc., are guaranteed to STRIP
On Tea Spoons, 48 dwts. per gross.
On Dessert Spoons and Forks, . . . 72 dwts. per gross.
On Table Spoons and Medium Forks, 96 dwts. per gross.

ALL OTHER GOODS IN PROPORTION.
All our Spoons, Forks, etc., are plated upon
18 PER CENT. NICKEL SILVER,
The best base known for plating upon.



Our Hollow Ware is plated upon the
FINEST WHITE METAL, and is guaranteed
to be plated fully
50 PER CENT. MORE SILVER
than any other brand of goods in the market.

OUR GOODS ARE PLATED 20 PER CENT. ABOVE STANDARD PLATE.

The above is a facsimile of our guarantee card which accompanies all goods.

THE HARTFORD.
Pat'd Sept. 23, 1879.



OUR GOODS ARE PLATED 20 PER CENT. ABOVE STANDARD PLATE.

Address all communications to

WILLIAM ROGERS & SON,

DEPOT, 100 CHAMBERS STREET, NEW YORK.

DRAWER 30, HARTFORD, CONN.

HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.



THE "EASTLAKE." (Patented.)

Factories, Wallingford, Conn.

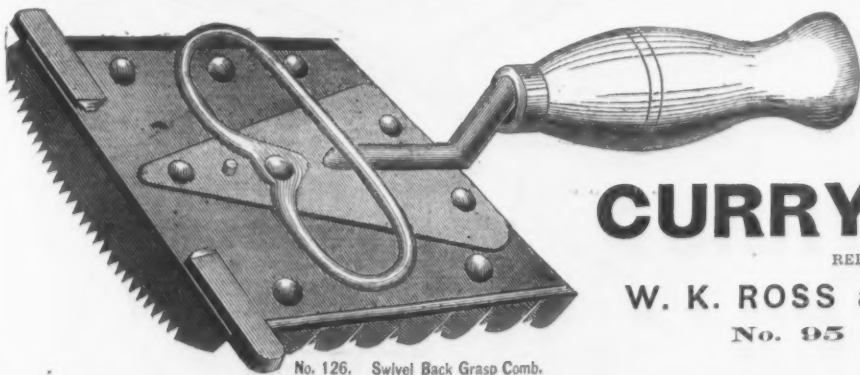
Salesroom, 75 Chambers Street, New York.



FORKS, SPOONS, Etc.,

Manufactured from Cast Steel, Plated with Nickel and Silver.

WALLACE BROTHERS, Wallingford, Conn.



No. 126. Swivel Back Grasp Comb.

W. P. KELLOGG,
TROY, N. Y.,
MANUFACTURER OF

CURRY COMBS.

REPRESENTED BY

W. K. ROSS and J. A. FULLER,
No. 95 Chambers St.,
NEW YORK.

Maltby, Curtiss & Co.,

Sole Proprietors and Manufacturers of

Capewell's Giant Nail Puller and Box Opener,

The Poole Can Opener, Victor Knife Sharpener, The Ross Lemon Squeezer,
Metal Key Maplewood and Rosewood Faucets, and other Hardware Specialties.
(Manufactory, WATERBURY, CONN.) 34 Reade St., NEW YORK.



Agents for E. C. Maltby
& Son, Nickel and Silver
Plated Spoons.

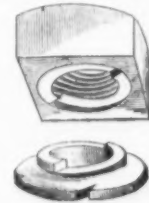
Sole Agents for the
Norwich Pistol Co.

To make the valve adjustable so that it may be set at any desired point and meet any requirement in the way of producing pressures in the outlet pipe, the lever H has been added, which is hung upon the fulcrum I. A sliding weight upon this lever, shown in Fig. 3, enables an additional upward thrust of any desired amount to be brought upon the valve, which diminishes the downward pull of the diaphragm by an equal amount. By means of this weight and lever the valve may be easily adjusted so as to deal with wide variations of pressure, both in admission and outlet. The value of a pressure regulator is so well known that it may seem a superfluous matter to enumerate its advantages. In some positions it is indispensable, or should be so considered. For example, when a boiler carries a high pressure, it is a waste of steam and an unnecessary strain upon pipes and connections to attempt to use full boiler pressure upon the heater coils of a building. In many places where the water works give excessive pressure in the street mains, a valve of this kind is of great value in relieving the house-service system from the strains and shocks to which it is always subjected under such circumstances. For bleaching, steaming chests, and for engines where very even pressures are needed, and, in fact, in any position where it is important to avoid variations, a pressure regulator will be found of great value.

Gray's Centrifugal Nut Lock.

It has been estimated that the loss resulting from the loosening and falling off of nuts from railroad cars in the United States alone, amounts annually to \$36,000. This amount does not include the loss from railroad tracks and engines; and if the loss from machinery of all kinds were added, the total would be still further increased. The importance of these figures clearly indicates that there is room for improvement in the manufacture of nuts adapted to resist the loosening effect of jarring, &c. Gray's Centrifugal Nut Lock is a device which, it is claimed, fulfills this condition.

The nut differs from the ordinary nut only from the fact that on the under surface and around the threaded hole there are two central inclined rabbets, commencing on the lower surface, extending half round the hole, and terminating in a vertical face. The two countersunk inclines are of equal depth. The other part of the device is a circular washer, with a rim, of which the edge alone bears upon the fish bar or other object through which the bolt may pass; while the under surface of the washer is hollow, allowing nothing but the rim to touch the bearing. The upper surface has a neck, upon which there are two central reversed inclines, corresponding exactly in size and shape to the sunken inclines of the nut, so that when the pressure of the thread brings the inclines of the nut to bear upon the inclines of the washer, the body of the nut and washer will clear at least one-eighth of an inch, in the same manner as the outside of the neck of the washer should clear the inside of the sunken inclines of the nut. Thus, by placing the entire pressure of the nut upon the center of the washer on one side, and the pressure of its bearing upon the extreme outer edge on the other, a leverage is obtained which is overcome, in tightening the nut, by reason of the two perpendicular rabbets



Centrifugal Nut Lock.

coming together advancing the washer with the nut until both are tight upon their bearings. In order to loosen the nut the difference of leverage gained between the central extreme bearings must be overcome, which cannot be done either by jars or by the use of common wrenches. But, should the nut be thrown backward by any pressure, it would hold the washer with greater pressure against its bearing surface, while the nut would be held from turning off the washer. It is, therefore, impossible to remove the nut without first overcoming the frictional contact between the washer and fish bar, and as the washer is made circular, in order that the bearing shall be as far from the center as possible, this cannot be done with the usual wrench, but it can be readily removed with a slightly modified form of wrench.

The Railroads and the Steel Rail Duty.—A number of additional memorials from railroad companies, remonstrating against any reduction in the rate of duty upon steel rails, have been presented to Congress by Senators Cameron, Pennsylvania; Conkling, New York; Thurman, Ohio; Logan, Illinois; McDonald, Indiana; Windom, Minnesota; and Vest, Missouri; and Representatives Kelley, Pennsylvania; F. Wood, New York; Garfield, Ohio; Dummell, Minnesota; and Morrison, Illinois. These were from the following: S. Chamberlain, president of the Cleveland, Tuscarawas Valley and Wheeling Railroad Company; John I. Blair, signing as president or main stockholder of the Chicago and Pacific, Sioux City (Dakota) and Pembina, St. Louis, Hannibal and Keokuk, Fremont, Elkhorn and Missouri, Des Moines and Minnesota, Chicago, Iowa and Nebraska, Sioux City Railroad, Maple River Railroad, Iowa Falls and Sioux City, Sioux City and Pacific, Cedar Rapids and Missouri River, Sussex Railroad, Warren Railroad, and Blairtown Railroad (in all 1750 miles); J. W. Branch, president of the Illinois and St. Louis Railroad; W. R. McKean, president of the Terre Haute and Indianapolis Railroad; John T. Itzler, president of the St. Paul and Duluth Railroad; George N. Black, general manager of the Springfield and Northwestern Railroad; Chauncey Ives, Chief Engineer of the Missouri Central (constructing), 15 miles; James I. Bennett, president of the Pittsburgh and Lake Erie; Thomas R. Sharp, president

of the Long Island Railroad; Thomas B. Kennedy, president of the Cumberland Valley Railroad Company; George B. Wiestling, president of the Mont Alto Railroad Company. These memorials, together with those reported last week and those from the Maine Central, the Cincinnati, Wabash and Michigan, the Chicago and Eastern Illinois, and the Valley Railway of Ohio, represent an aggregate length of 20,000 miles of railroad, where owners and operators do not want any of the imaginary benefits promised as the result of a lower rate of duty on steel rails.

English Road Locomotives for the Far West.

The steamship Erin brought recently a number of road locomotives and trains of wagons destined for the Far West, where they will be employed in the transportation of minerals and general merchandise. The vehicles, which were built in Rochester, England, will be shipped by the representative of the manufacturers in this city, to whom they were consigned, by rail, to Wadsworth, Nev. On their arrival there they will be at once put to work on certain central routes in that State, as follows: From Austin, down the Reese River Valley, to San Antonio, Montezuma, Alameda Valley, and Gold Mountain; from Austin, through the Big Smoky Valley, by Hot Springs, Jefferson, Jett and Pea Vine, to Rallston Valley; from Wadsworth, through Walker Lake, to the Virginia Salt Marsh, Belleville, Columbus, Candelaria and Silver Peak; from Eureka, through the Little Smoky Valley to Tybo, Hot Creek and Reville, and from Eureka to White Pine, Ward and Pioche.

The engines adopted by the Nevada Steam Transportation Company, which is the title of the corporation of capitalists who have bought them, and who intend to work them in the West, are very similar to those used by European governments, differing only in the fact that they are unprovided with a crane, which is fitted on occasion to the engines in the European armies, and is used for placing large ordnance in position and the lifting of other heavy weights. The leading characteristics of the engines brought by the Erin are described as follows: They weigh about seven tons each, and are rated at 12 to 14 horse-power. They have horizontal boilers, which are fitted with large fire-boxes for burning almost any description of fuel, and water tanks are affixed capable of holding a supply for three or four hours. The engines are so arranged that they can be used for turning fixed machinery. The driving wheels are 7 feet in diameter and 12 inches in width, and the steering or front wheels are 4 feet in diameter and 9 inches wide. An important advantage in the road locomotive is that in case of need the road wheels can be replaced by the ordinary flange wheels for running on rails. Those brought by the Erin have an important addition, in the shape of a winding drum, fitted to the driving axle, capable of holding from 50 to 100 yards of coiled rope, which can be employed in hoisting heavy weights and in hauling the loaded wagons up otherwise impracticable grades. A trial of this novel addition was made before the locomotives left England. The engine used for the experiment was one of 20 horse-power, and it had hauled in the ordinary manner, on a roadway varying in grade from one foot in twenty to one foot in ten, and with a steam pressure of 100 pounds, a load of 32 tons of iron on four wagons, the aggregate weight of the wagons and their loads being 40 tons. When a certain hill having a grade of one foot in ten had been reached, the engine was brought to a standstill by the load. The brakes were applied to the wagons, and the engine was detached and steamed higher up the hill to a grade of one foot in eight. It was made fast to the load, which was further increased by the addition of an extra engine weighing 10 tons. The whole train, aggregating 50 tons, was then pulled up by the winding drum, without a snatch-block, to and on the grade of one foot in eight where the locomotive stood.

One engineer and two laborers are all the manual force necessary for the management of each train, and on moderate roads, with grades not exceeding 1 foot in 12, each engine of the size sent to Wadsworth will haul from 10 to 12 tons of paying load, and travel at an average speed of 3½ miles per hour. Two or three wagons, each capable of containing from five to six tons' weight, and the engine form the train. The wagons are coupled together and to the locomotive by strong coupling bars, and the whole train follows exactly in the track of the engines, even when turning sharp curves. The total cost of hauling by the road locomotives, it is estimated, will range from 5 to 10 cents per ton per mile, varying with the condition of road and load. This is probably not one-fourth of the cost of doing similar work with mules. The ordinary mule team, consisting of 16 mules, with heavy wagons capable of holding six to ten tons, will not average more than two miles an hour. The first cost of the locomotive, with its train of wagons, compares favorably with the first cost of the mule team and wagons.

The Stevens Battery.—A petition for an order permitting the sale of the Stevens Battery by the commissioners appointed by the governor of New Jersey, is to be presented this week to the United States Supreme Court by Messrs. Abbott & Fuller. It sets forth that the battery occupies land worth \$125,000, upon which no taxes have been paid since 1845, and that although it will cost \$500,000 to complete it, in addition to the \$1,800,000 already spent upon it, there remains only \$100,000 of the money bequeathed under the will of Edwin A. Stevens. It is declared that one man has to be employed constantly to watch it, and that workmen have frequently to be employed to keep it in repair. The petition is signed by the commissioners, Gen. Fitz John Porter, W. W. Shippen and Benjamin G. Clarke, who say that the vessel might have been sold in time of war to a foreign government had it not been for the apprehension of the Executive Department that it would be used against a country with which the United States are at peace.

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

J. W. LYNDE, Secretary.

PLATTSBURG, N. Y.

STERLING & CO., Agents, 7 and 9 Cliff Street, New York.

METALLIC AMMUNITION,

Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,

Guaranteed Superior to any Imported.

THE UNION METALLIC CARTRIDGE COMPANY,

BRIDGEPORT, CONN.



PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.



PERCUSSION CAPS.

F. C. Trimmed Edge, W. Proof.
F. L. Ground Edge, W. Proof, Foil Lined, equal to any imported.
D. W. P. Ground Edge, W. Proof, Central Fire, equal to any imported.
Musket, Paper and Tin Boxes.
Berdan, Orcutt and Wesson Primers.
Bullet Breech Caps.

PAPER and BRASS SHOT SHELLS.

PAPER.

Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

BRASS.

Berdan, Solid Anvil. Sturtevant, Movable Anvil. Buffington, Movable Anvil.
Berdan Primer.

Kenney's Patent Indentation to prevent Wads from starting.

Agents: **HARTLEY & GRAHAM, New York.**



A. A. WEEKS,
Manufacturer of
Hardware Specialties,
82 John St., New York.

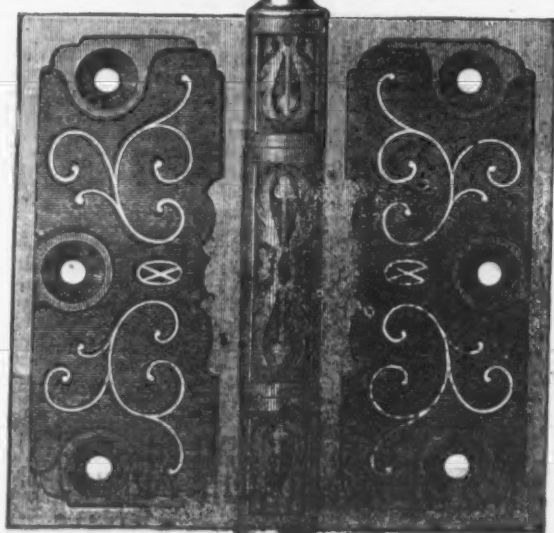


A. WYCKOFF,
Manufacturer of
Wyckoff Patent Wood Water Pipe,
Steam Pipe Casing,
Chain Pump Tube, Curbs, Reels, Rubber
Valves, Chains, &c.
Established 1855. Send for pamphlet,
ELMIRA, N. Y.

THE CLARK MFG. CO.,

Successors to
MANUFAC

CLARK & CO.,
TURNERS OF

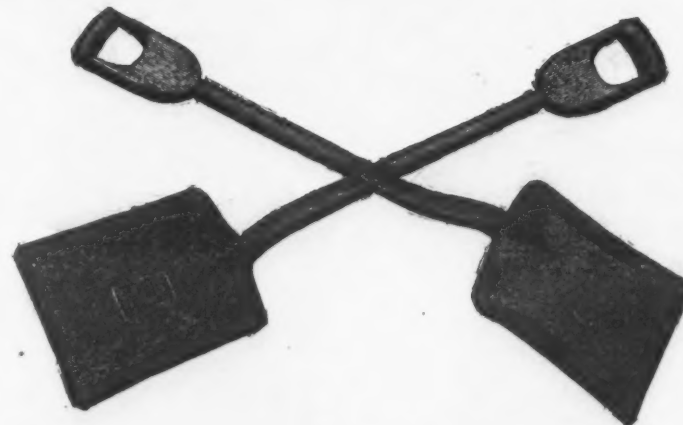


SEND FOR CATALOGUE

AND PRICE LIST.

BUILDERS' HARDWARE,
BUFFALO, NEW YORK.

HUSSEY, BINNS & CO.,



PITTSBURGH.

SHOVELS,
SPADES and
SCOOPS.

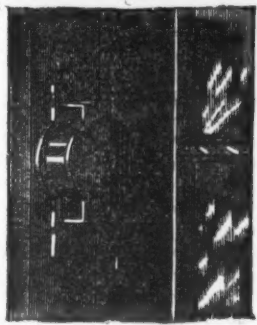
PATENT ANTI-WINDOW RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.

The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter how great the jar or how old the sash. As shown in cut, it consists of a rubber wheel in a nickel-plated or brass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

HEATON & DENCKLA, General Agents, 507 Commerce St., Philadelphia.
GRAHAM & HAINES, Agents, 113 Chambers St., New York.
OTIS D. DANA, Agent, 25 to 32 Pearl St., Boston, Mass.



PROVIDENCE TOOL CO.

Providence, New York, Boston, Chicago.



Wrist & Ankle Shackles,

REVERSIBLE

ICE AND FLOOR SCRAPERS,

MADE BY

PROVIDENCE TOOL CO.,

Providence, R. I.

The advantage of this Scraper is that each cutting edge can be changed as fast as worn, and present a new and sharp-cutting edge. Thus the Scraper can be all used and the whole blade made available. It is especially useful in cleaning ice from sidewalks. Price, \$9 per doz.



N. Y. Mallet and Handle Works



Manufacturers of
Calkers', Carpenters', Stone Cutters',
Tin, Copper and Boiler Makers'
MALLETS,

Hawking Beeties, Hawking and Calking Irons: also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also
COTTON AND BALE HOOKS.
Patented Feb. 13, 1877; a new combination of Hooks.
456 E. Houston St., New York City.

THE FAR-FAMED
AMERICAN LUBRICATOR
AMERICAN LUBRICATOR CO.
DETROIT, MICH. U.S.A.

The Hardening of Steel.

The chemical and physical changes which occur in the phenomena of hardening, tempering and annealing of steel, have probably been studied by no one as closely as by Mr. William Metcalf, C. E., of Pittsburgh, and the publication of the records of facts observed and examined by him and Prof. Jno. W. Langley, jointly, rank among the most important additions to the literature of the subject. Before a recent meeting of the Engineers' Society of Western Pennsylvania, a newly formed organization, Mr. Metcalf read a highly important paper, from which we call the following facts. With a view to determine the accuracy of ocular inspection, Mr. Charles Parkin numbered 12 bars of steel according to the percentage of carbon, judging their order from the appearance of the structure of the steel. The bars were analyzed by Prof. Langley with the results recorded in

TABLE I.

Ingot Numbers.	C.	Si.	Ph.	S.	Fe. by Diff. ce.	Sp. Gr. Ings.
1.....	.378	.019	.047	.018	99.614	7.855
2.....	.495	.034	.055	.016	99.453	7.856
3.....	.539	.043	.047	.018	99.363	7.847
4.....	.649	.039	.030	.012	99.270	7.829
5.....	.801	.029	.035	.016	99.110	7.838
6.....	.841	.038	.024	.010	99.081	7.834
7.....	.867	.057	.014	.018	99.044	7.810
8.....	.871	.053	.024	.012	99.040	7.818
9.....	.955	.059	.070	.016	98.900	7.813
10.....	1.003	.088	.034	.012	98.801	7.807
11.....	1.058	.120	.064	.006	98.754	7.803
12.....	1.079	.039	.044	.004	98.834	7.805

While this table clearly shows that the carbon increases regularly, but not uniformly, with the numbers, the entire absence of phosphorus and sulphur, shows that these elements had nothing to do in determining the characteristic fractures. The size, color, and form of the crystals of the steel, when allowed to cool without hindrance, are mainly governed by the quantity of carbon present. The column of iron by difference happens to run with the carbon column, except in No. 11, where the series is broken by the abnormal amount of Si in that ingot. Theoretically, of course, the specific gravities should run with the iron by difference, but they do not do so in ingots 3 and 5. These, however, are the only exceptions; this may have been caused by incomplete or unusually hot melting, or by hot or cold pouring, or by slow or fast pouring.

With the object of determining the effect of hammering and the effect of heating to various temperatures upon the specific gravity of the steel before hardening, the following series of experiments was made with ingots Nos. 3, 4, 6, 8, 10 and 12. They were hammered to bars 1.25 inches square at one end, and these bars were rolled to round bars 0.625 inch in diameter. Six nicks were made around each bar at one end, at intervals of about half an inch, the six pieces being numbered from one at the end to six. Each notched bar was then heated slowly and carefully until piece No. 1 was scintillating, or nearly white hot; No. 2 was yellow hot; No. 3 high red hot; No. 4 red hot; No. 5 barely showing any red, or very low red hot; No. 6 black; and as soon as these heats were obtained the bars were quenched in water. In the table the left-hand column gives the ingot numbers. The other columns give the specific gravities of the ingots, the bars—No. 6 pieces—and of the other five hardened pieces in their order. The differences are, first, the difference between the specific gravity of the ingots and the bars; second, the difference between the specific gravity of the bar, or piece No. 6, and each piece successively. The differences of specific gravity are given in preference to the actual differences in volume, because the differences in volume run into the infinitesimals, and the mode adopted answers as well for purposes of comparison.

TABLE II.

Ingot No.	Specific gravity.	Specific gravity.	Difference.	Specific gravity.	Difference from bar.	Specific gravity.	Difference from bar.	Specific gravity.	Difference from bar.	Specific gravity.	Difference from bar.
3	7.847	7.844	-.003	7.844	-.003	7.844	-.003	7.844	-.003	7.844	-.003
4	7.829	7.829	0.000	7.829	0.000	7.829	0.000	7.829	0.000	7.829	0.000
6	7.838	7.838	0.000	7.838	0.000	7.838	0.000	7.838	0.000	7.838	0.000
8	7.810	7.810	0.000	7.810	0.000	7.810	0.000	7.810	0.000	7.810	0.000
10	7.807	7.807	0.000	7.807	0.000	7.807	0.000	7.807	0.000	7.807	0.000
12	7.805	7.805	0.000	7.805	0.000	7.805	0.000	7.805	0.000	7.805	0.000

3. The greater the quantity of carbon present the greater is the change in volume due to a change of temperature. The latter is perhaps the most important observation that can be made on this series of experiments, as it shows us why it is that high steel is so much more liable to crack and break in manipulation than low steel. It is generally said that one is brittle and the other is ductile, but it is now shown that the rate of expansion per degree of temperature is much less in low steel than in high steel. Therefore, low steel is much less liable to injurious internal strains than high steel.

In order to settle the question of restoring "burned steel," so called, and also to determine the reverse action due to annealing, Prof. Langley took the six pieces No. 1 of Table II and heated them all to a high yellow heat; he then allowed them to cool very slowly. This raised a heavy scale on the pieces, which was removed by touching them on an emery wheel. The specific gravities of these pieces were then taken, and the results are given in the table, the first column being the ingot numbers, the second the specific gravity of bars No. 2, the third the specific gravity of burned pieces, annealed, of No. 1 and the last column the difference:

TABLE III.

Ingot No.	Specific gravity.	Specific gravity.	Difference.
3	7.844	7.857	+.013
4	7.829	7.845	+.016
6	7.838	7.855	+.017
8	7.810	7.828	+.018
10	7.807	7.824	+.017
12	7.805	7.822	+.017

The restoration to the specific gravity of the bar is complete, as the differences are only such as might be due to the scale on the original bars and the removal of the scale from the annealed pieces.

In order to ascertain the effect of cold hammering under the best conditions to increase the specific gravity, by hammering between semi-circular dies, a round bar containing about 1.0 per cent. of carbon was operated upon. No. 1 in the following table gives the figures for the 0.625-inch bar as it comes from the rolls, annealed, No. 2 being a piece of the same bar, 0.673 inch in diameter, annealed and pickled. No. 3 is the same bar reduced to 0.624 inch by twice hammering cold after annealing, while No. 4 has been reduced to 0.564 inch by being hammered cold four times after annealing. In the following table column I gives the specific gravity, II the specific gravity after hardening, III scaled and not hardened. Column IV gives the difference between the figures in II and III, showing the effect of hardening upon the specific gravity, while column V gives the difference between the figures in III and I.

TABLE IV.

Ingot No.	I.	II.	III.	IV.	V.
No. 1 unan..	7.807	7.813	7.829	-.016	+.022
No. 2 an... 7.794	7.794	7.828	7.828	-.034	+.034
No. 3 ham. twice.....	7.816	7.790	7.817	-.027	+.001
No. 4 ham. four times	7.789	7.765	7.780	-.015	-.007

The first column gives the figures for the specific gravity found by Prof. Langley, who used the samples as he received them, and 2 having the roll scale upon them, and 3 and 4 being bright polished and slowly cooled. Thinking that the results might have been affected by scale in the first two pieces, he removed the scale and boiled them all in weak potash, and upon taking them from the boiling liquid, cooled them rapidly by plunging them into cold water. The results recorded in column II reveal the remarkable fact that sudden cooling from boiling temperature causes a hardening effect, which is shown more particularly in Nos. 3 and 4, where there is a decided reduction in specific gravity. If subsequent trials prove this deduction to be correct, it is very important. Desiring to fortify himself as to this matter of hardening at such a temperature, Prof. Langley again boiled the pieces and allowed them to cool very slowly, thus annealing them. The results are given in column No. III. Here is a progressive reduction, showing that cold hammering, as well as cold rolling, reduces specific gravity. The restoration of the specific gravity of 3 and 4 to the results in column No. I shows that there was a hardening due to quenching from boiling temperature. The column of differences III and II (IV) shows the effect of hardening, while the column of differences III and I (V) shows the effect of removing the scale. This column also accounts for the increase of specific gravity shown in the "restored" or annealed piece of No. 1, Table I, recorded in Table III.

The improvement in business promises to give life to a great many latent industrial enterprises and lead to the establishment of others, especially in small towns in the West. Many of these towns, realizing the advantage of the establishment of manufacturing among them, are holding out liberal inducements to those who will locate in their midst. We have before us the circular of the Parnassus (Pa.) Industrial Association. Parnassus is a little town on the line of the Allegheny Valley Railroad and on the Allegheny River, 17 miles from Pittsburgh, and just over the Allegheny County line. It is in the midst of a good coal field, and with natural gas wells, both north and south. This association offers a liberal donation of land lying between the railroad and the river, with a river frontage, together with a liberal donation in cash, to any manufacturing establishment that will locate in Parnassus. The town is free from debt and taxation light. The facilities for transportation are very good; arrangements for low freight can be made, and the offer is a liberal one. The association prefers the establishment of several small works to one large one. Any one seeking a location for manufacturing purposes may find the inducements offered at this point well worth considering.

A company comprising a public exchange, a trust department and a clearing house is about to begin operations in this city. The promotion of mining interests is the main object of the movement, and the list of trustees and officers includes the names of many men of wide reputation, both in the East and the West. The capital of the company will be \$5,000,000. Loans will be made on mining shares, and it is intended to give to mining interests a position they have not before had in this city. Only the shares of mines of real value will be dealt in at the Exchange.

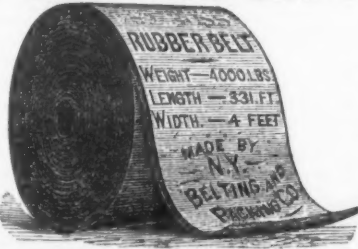
Vulcanized Rubber Fabrics

ADAPTED TO

MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevator
Belting,
Steam Hose,
Piston-Rod
Packing,
Gaskets and Rings.



Vacuum Pump
Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Wringer Rolls,
Billiard Cushions,
Grain Drill Tubes,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the Largest Belts in the World. We are now making an Elevator Belt, 36 inches wide and 250 feet in length, which will weigh over 15,000 pounds.

LINEN and COTTON HOSE.



Plain and Rubber Lined.

Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.



Emery Wheels and Packing.



ORIGINAL
Solid Vulcanite
EMERY WHEELS



LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.
The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

PATENT ELASTIC Rubber Back Square Packing

BEST IN THE WORLD.
For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.
B represents that part of the packing which, when in use, is in contact with the piston rod.
A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

Corrugated Rubber Mats and Matting.

For Halls, Flooring, Stone and Iron Stairways, &c.
This practical and indispensable article—especially for wear where exposed to ice, snow, or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap, inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

NEW YORK BELTING & PACKING CO.,
Warehouse, 37 and 38 Park Row, New York.
JOHN H. CHEEVER, Treasurer.

BLACK AND TINNED IRON RIVETS.

5 oz. 1 lb. 1 1/2 lb. 2 lb. 3 lb. 4 lb. 6 lb. 7 lb. 8 lb.

CURVE HEAD. TRUSS HEAD. CONE HEAD. ROUND HEAD. COUNTERSUNK HEAD. STEEPLE HEAD. GORE HEAD. FLAT HEAD. MACHINE HEAD. TIRE BLANK.

W. P. TOWNSEND & CO.,
PITTSBURGH PA.,
Manufacturers of every description of First Quality
RIVETS.

BULL'S EYE

Years of experience have demonstrated the fact that no
SIDEWALK LIGHT
has ever equalled the old **BULL'S EYE**.
Cheaper than Gratings.
E. K. Chamberlin & Co.,
CLEVELAND, O.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, March 4, 1880.

DAVID WILLIAMS . . . Publisher and Proprietor.
JAMES C. EAYLES . . . Editor.
JOHN S. KING . . . Business Manager.

RATES OF SUBSCRIPTION INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND
SANDWICH ISLANDS.

Weekly Edition . . . \$4.50 a year.
Issued every THURSDAY morning.

Semi-Monthly Edition . . . \$2.30 a year.
Issued the First and Third THURSDAY of every month.

Monthly Edition . . . \$1.15 a year.
Issued the First THURSDAY of every month.

TO ALL OTHER COUNTRIES.
PER ANNUM, POSTPAID.

Weekly Edition: \$4.00—£2—25 francs—20 marks—12
florins—6 roubles (coin)—5 lire—40 pesetas.

Semi-Monthly Edition: \$2.00—£1—12½ francs—10
marks—5 florins—3 roubles (coin)—12½ lire—10
pesetas.

Monthly Edition: \$1.25—50¢—6¼ francs—5 marks—3
florins—1¼ roubles (coin)—5¼ lire—5 pesetas.

REMITTANCES
should be made by draft, payable to the order of David
Williams, on any banking house in the United States
or Europe; or, when a draft cannot be obtained, in
postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS
In any part of the world may obtain *The Iron Age*
through the American News Company, New York, U.
S. A.; the Wilmer & Rogers News Company, New
York, U. S. A.; and London, England; or the San Fran-
cisco News Co., San Francisco, California, U. S. A.

RATES OF ADVERTISING.
One square (12 lines, one inch), one insertion, \$2.50;
one month, \$7.50; three months, \$15.00; six months,
\$25.00; one year, \$40.00; payable in advance.

DAVID WILLIAMS, Publisher,
33 Reade Street, New York.

PITTSBURGH . . . 77 Fourth Avenue
Jos. D. Weiss, Manager and Associate Editor.

PHILADELPHIA . . . 320 South Fourth Street
Thos. Horson, Manager.

CINCINNATI . . . Builders' Exchange
T. T. Moore, Manager.

CHATTANOOGA . . . Eighth and Market Streets
S. B. Lowe, Manager.

BRITISH AGENCY.
The publishers of *The Iron Age*, as Cannon street,
London, England, will receive orders for subscriptions
and advertisements on our regular terms.

CONTENTS.

First Page.—Notes on the Blast Furnace.

Third Page.—Notes on the Blast Furnace
(Continued). The North Staffordshire Coal and
Iron District.

Fifth Page.—The North Staffordshire Coal
and Iron District (Continued). The Topophone.

Seventh Page.—Buildings and Engine Founda-
tions for Water Works.

Ninth Page.—New Pressure Regulating
Valve.

Eleventh Page.—Gray's Centrifugal Nut
Lock. English Road Locomotives for the Far
West. The Stevens Battery.

Thirteenth Page.—The Hardening of Steel.

Fourteenth Page.—Congress and the Tariff.
The Labor Question. A Novel Plan for the Im-
provement of the Ohio. The Piercing of the St.
Gothard.

Fifteenth Page.—The Reciprocity Idea in
the British Parliament. Iron from Under Cleo-
patra's Needle. The American Hand Pump.
New Publications. The Hoop Iron Duty.

Sixteenth Page.—The Work of the Han-
cock Inspirator. Recent Commercial Decisions.

Seventeenth Page.—Metallurgical Notes. The
Duplex and Quadruplex Transmitters. Scotch
Pig Iron. Industrial Items.

Eighteenth Page.—Petroleum as a Fuel for the
Blast Furnace.

Nineteenth Page.—Trade Report. General
Hardware.

Twentieth Page.—Gen. Hardware (Con-
cluded). British Iron Market. Iron. Metals.
Coal. Imports.

Twenty-first Page.—Exports. Old Metals,
Paper Stock, &c. Philadelphia. Pittsburgh.
Chattanooga.

Twenty-second Page.—Boston. Baltimore.
Richmond. Louisville. St. Louis. Cincinnati.
New Orleans. Our English Letter. Foreign.

Twenty-third Page.—Foreign (Continued).

Twenty-fourth Page.—The Iron Age Direc-
tory.

Twenty-fifth Page.—New York Wholesale
Prices.

Twenty-sixth Page.—New York Wholesale
Prices (Continued).

Twenty-seventh Page.—New York Wholesale
Prices (Continued).

Twenty-eighth Page.—Philadelphia and Pitts-
burgh Hardware and Metal Prices.

Twenty-ninth Page.—Boston Hardware and
Metal Prices.

The Labor Tribune, in a recent issue, adds
to its many offenses against good taste, one
which will shock readers whose sensibilities
are not wholly desensitized by the bitterness
of partisan struggles to deprive the work-
ingman of his right to sell his labor where
he can do so to the best advantage. We
quote as follows: "A terrible boiler explo-
sion occurred at the Solar Iron Works,
Wm. Clark & Co., this city, on last Mon-
day evening, killing one man, Albert
Oren, fatally injuring Jacob Berger
and seriously scalding two others. A
singular coincidence in connection with
this sad affair is that it was the first an-
niversary of that memorable day when Tom
Carr, Tom Slater and others went to work
at the above place pending the strike
against a reduction of five cents per ton
for muck rolling. We take it as an evi-
dence that He who rules the universe has
no sympathy with non-union men, and
has given them this timely warning to
redeem themselves or prepare for an un-

"timely end." How much sympathy "He
who rules the universe" has with this
kind of talk, would be an interesting sub-
ject for thought.

Congress and the Tariff.

After many weeks of trifling with grave
questions affecting in a serious degree sev-
eral of the great industries of the country,
the Ways and Means Committee of the
House have displayed an amount of wisdom
for which no one was prepared to give them
credit. They have made a clean sweep of the
bills introduced by those seeking to "honey-
comb" the tariff—to use the expressive
phrase attributed to Mr. Wood—and none
of them will be reported to the House this
session, if at all. Mr. Gibson's sugar bill
was first considered, and a motion to adopt
it was lost by a vote of 7 to 6. Mr. Gibson
then moved to indefinitely postpone the con-
sideration of the sugar question, and it was
carried by a vote of 8 to 6. Mr. Covert's
bill reducing the duty on steel rails to \$10
per ton of 240 pounds was then brought
up, and Mr. Frye's motion to lay it on the
table was carried by a vote of 7 to 6. It is
not, we think, likely to be taken up
again by this Congress. Consideration was
then given to Mr. Morrison's little bill, and
the result is calculated to discourage that
gentleman from further attempts to appear
as a "tariff reformer." This bill provided
that on and after July 1, 1880, no duty
should be assessed or collected in excess of
50 per cent. ad valorem, on any article em-
braced in schedules A, B, C, E, K, L, and
M, of section 2504 of the Revised Statutes
and not subject to internal revenue laws, as
follows:

Schedule A—Cotton and cotton goods.

Schedule B—Earthenware.

Schedule C—Hemp, jute and flax goods.

Schedule E—Metals.

Schedule K—Wood.

Schedule L—Wool and woolen goods.

Schedule M—Sundries, except bay rum or bay
water and other perfumery of which alcohol forms
a component part, rum, essence or oil and bay
rum essence or oil, fuel oil or amyl alcohol,
opium and all preparations of opium, and playing
cards.

Mr. Garfield moved that the consideration
of this bill be indefinitely postponed, and
the motion prevailed by a vote of 7 to 6.
Mr. Gibson then offered a motion providing
that a sub-committee of four be appointed to
consider the whole revenue system with a
view to its revision, and to report their con-
clusions at the opening of the next ses-
sion. This was promptly tabled, and the
committee adjourned.

However regarded, this means the defeat
of all the well-laid schemes to undermine
the tariff. We expected this, but could
scarcely have hoped that the Ways and
Means Committee would constitute itself
the executioner of all the bills of this class
referred to it. A few days ago, it looked as
if the Covert bill, amended so as to make
the new duty \$14 instead of \$10, would pass
the committee, and no doubt it would but for
the vigorous protests of the responsible
heads of twenty-five thousand miles of rail-
road, and the accumulated evidence that the
attempt to make it appear that the railroad
interest demanded the change, was dis-
honest. It would have been a great deal
better if the agitation had never begun, but
the next best thing is to strangle it in com-
mittee. We are strongly of opinion that before
another Congress shall assemble a majority
of those who are now rather favorably dis-
posed toward a general reduction of duties,
will take a very different view of the matter.
The conditions which make protection seem
unnecessary to many who reason only from
the events of the moment, cannot last
always, if indeed it can last long. The effect
of the great activity in all branches of
trade, of high prices and of satisfactory
average profits, has been to enormously stim-
ulate production. It is not supposable that
the increase of consumption will keep pace
with the development of our productive in-
dustries, and the time cannot be far distant
when the competition among domestic man-
ufacturers will be more favorable to con-
sumers than the competition of foreign man-
ufacturers could be, if secured by sacrificing
the conditions which in the largest degree
develop and diversify home industry. The
tariff has accomplished its purpose in great
degree, and vindicated the prophecies of
those who were instrumental in securing its
adoption as a system; but we have not yet
reached a point where we can dispense with
it. The general adoption of the principle of
protection by countries desiring an industrial
development, makes Great Britain more
than ever formidable as a competitor. With
a productive capacity disproportioned to the
demands of the markets she now has
to supply, she would take advantage
of any tariff concessions we might make
to pour into our markets an avalanche of
merchandise. What we gained in cheap-
ness for the time we should lose a hundred-
fold in losses on capital invested in man-
ufacturing plant, in the enforced idleness of
our mechanics and in the removal of the in-
ducements which now attract so large an
immigration to our shores. If it be conceded
that we no longer need the tariff to stimu-
late our industrial development, it must be
admitted that we need it for defense. The
measure of industrial independence we have
gained by conquest we must hold, or it will
be taken from us. Time may change all
this; but it will not be an act of wisdom on
our part to be misled by the illusions of free
trade, into abandoning, in whole or in part,
a system which has made the nation indus-
trially great and will keep it so.

The Labor Question.

Evidences multiply that we are once more
entering upon a season of more or less
serious disturbances in the labor market,
when the relations of labor and capital will
again attract a great deal of attention. It
is only natural that under such conditions
as those at present existing, labor should be-
come restless. Workingmen, as a class, do
not reason deeply. They see what appear to
be the evidences of abounding prosperity
on every hand, and are only influenced in
their action by the desire to secure the
largest measure of immediate advantage at-
tainable. They know but little, and care
less, about the influence which present action
will have on their interests a year or five
years hence. What power they have they
will use, and it is only when their power is
broken that they yield.

For some years past labor has suffered
more or less seriously from causes which
have wiped out so much capital. The
gradual, but inevitable, decline in wages
was resisted as long as possible, but it went
on all the same—probably even more rapidly
than it would had an intelligent co-opera-
tion between masters and men, looking to
an adjustment of their relations on a basis
mutually advantageous and in harmony
with the changed conditions of trade, been
possible. When the bottom was reached,
labor was practically powerless. The com-
petition for employment was active, and the
labor unions either fell to pieces or maintained
a nominal organization in the hope that better
times would give them a new influence.
This chance seems to have come, and it is
not to be wondered at that demagogues and
ambitious leaders of the labor movement
are again coming to the front. Naturally,
they will say a great deal that is calculated
to excite alarm in the minds of timid people.
Probably the effects of their work will be
seen in strikes and perhaps in more or less
violent demonstrations, as success in gaining
their first demands emboldens them to ask
for many things they cannot have and will
not get. During the next few months we
may expect to witness strikes and distur-
bances in some, at least, of the prominent
trades, and perhaps in all of them; but the
net result will be little different in the end
from that which would have been reached by
the operation of natural causes. The dis-
turbances caused by strikes and riotous de-
monstrations are, after all, only temporary.
Capital seeks investment where a profit can
be earned, and withdraws from industries
which from any cause become unprofitable.
Nothing causes it to withdraw from man-
ufacturing operations sooner than unreason-
able demands of the working classes. Labor
cannot stand in competition with itself.
When the supply of men skilled in any art
is greater than the work to be done in this
line calls for, wages inevitably decline,
and no combination, however well organ-
ized, can arrest this decline. When, as now
in many trades, there is more work to be
done than workmen to do it, and employers
are competing with each other for skilled
mechanics and workmen of various grades,
the tendency of wages is inevitably upward.
At such times strikes are only a clumsy and
costly means of securing that which would
naturally come about in good time.

There is probably no means by which it
would be possible to effect a readjustment
of the relations of labor and capital on a basis
which would admit of general application.
This is only possible in specific instances;
but when a good understanding can be
reached, it is of benefit to both parties in in-
terest. As the rule, employers are disposed
to have a good understanding with their
men. They are willing to deal fairly
and liberally with them, and if confi-
dence is once established, the masters
would be the last to violate it. We do
not suppose that anything we might
say would influence the action of the work-
men in the trades we represent, but it may
have some influence with employers. In
view of all the probabilities, we would advise
them to take the initiative in establishing a
good understanding with their men. If they
are in a position to advance wages it would
be good policy to do it, after a full and fair
explanation of the circumstances. More
than this, it would be wise and liberal to
give assurance that such further advances
as may be warranted by the condition of
business will be made without demand.
Such a course would do much to avert the
danger of strikes. Many have already
adopted this course with advantage. Deal-
ing with labor is always difficult and often
discouraging; but a broad and liberal policy
is always the best in the end for both mas-
ters and men.

The announcement of the proposed for-
mation of an iron association in the Mahoning
and Shenango valleys has excited con-
siderable interest in iron circles in the West,
and has had a somewhat depressing effect
in the tone of the market during the past
week. A great deal more importance has
been given this movement than it deserves.
It was immediately assumed by buyers that
this meant a withdrawal from the Western
Iron Association and a fight over prices.
We are not advised as to the character of
the new association, except from newspaper
reports; but these represent that the new
association is organized as an auxiliary to
the Western Iron Association, and for the
purpose of regulating their local matters.
This is no new thing. Cincinnati has had
such an association for years. Wheeling

has one which acts in harmony with the
Western Nail Association, and the nail mills
of Indiana and further West have such an
association also. It would also seem from
the reports that the organization includes
but a small percentage of the mills of these
two valleys. Only eight mills were reported
present. Two of the three Newcastle mills
were absent, both of the Sharon mills, the
Greenville, Hubbard, Akron, all four at
Niles; the two Cleveland and the Erie mills
were not represented. These parties may
or may not be in sympathy with the move-
ment. One thing is certain, this movement
does not mean a fight on prices, and those
who are basing any calculations for the fu-
ture on this will probably be mistaken.

A Novel Plan for the Improvement of the Ohio.

Gen. Herman Haupt, who has an excel-
lent reputation as a civil engineer, having
been connected with some important en-
gineering works, as the Hoosac Tunnel and
the construction of the Pennsylvania Rail-
road over the Allegheny Mountains, includ-
ing the famous horse-shoe bend, has per-
fected and presented to Congress a novel
scheme for the improvement of the Ohio
River, to give a 6-foot stage of water the
entire year. The text of his memorial,
which has been referred to the Committee
on Commerce, is as follows:

To the Senate and House of Representatives
of the United States in Congress assembled: The
petition of Herman Haupt, civil engineer, respec-
tfully represents:

That about the year 1855, while connected with
the Pennsylvania Railroad Company as its Chief
Engineer, he examined and reported upon plans
for the improvement of the Ohio River, and pre-
pared a system for such improvement differing
essentially from any other.

That subsequently, to wit, in 1871, the plans of
your petitioner and others were examined and re-
ported upon by engineers in the service of the
United States, but that said reports have not given
a correct presentation of the case, and the es-
timates therewith presented are excessive.

Your petitioner represents that since the former
report he has given the subject of the radical im-
provement of the Ohio River much and careful
consideration, and claims that, even with the min-
imum supply of water furnished by the Ohio River
at Pittsburgh, at its minimum or zero stage, an
open, unobstructed navigation can be secured for
the entire distance from Pittsburgh to Louisville,
with a depth of water of 6 feet, and such that as-
cending and descending fleets of barges can pass
each other at any and every point without deten-
tion by locks or otherwise, and without requiring
the use of reservoirs, and at a cost less than by
any other mode of improvement, and probably
less than one-fourth the cost of locks and dams.

Your petitioner prays that the plans referred to
may be examined by the proper committee having
such matters in charge.

HERMAN HAUPT,
Civil Engineer.

The original idea had as one of its fea-
tures the use of reservoirs, formed by slack
water dams, on the tributaries of the Ohio,
to store the surplus waters and to let out, as
the river demanded, sufficient water to fill a
channel 200 feet wide at the lowest stage.
The present plan dispenses entirely with
reservoirs, and substitutes a peculiar mode
of retardation which, without obstructing
navigation, will so effectually check the
flow of water as to secure a depth of 6 feet
in a channel 300 feet wide, without locks,
and will permit fleets of coal boats to pass
at any point without delay. These results
are secured, as described by Gen. Haupt, as
follows:

1. The width of the channel is reduced from
1300 feet in the ordinary bed to 300, by a bank
parallel to the shore, with enlargements or basins
when necessary. Low dams turn the water into
this channel, which would not be continuous, but
in 50 or more pieces.

2. The slope of the channel, where it exceeds
2 feet to the mile, is reduced to 2 feet, with cross-
banks at intervals of about 400 feet, the tops of
which are on the plane of grade of the bottom of
the proposed channel, leaving the intervening
spaces to be gradually filled in by deposits.

3. The third and most novel and important im-
provement consists in the plans for retarding the
flow. These consist in two forms of wickets act-
ing on the same principle, one for ascending, the
other for descending navigation.

The peculiarity of these wickets is that
they are inclined up or down stream, as re-
quired, at a small angle, and adjusted so as
to float just, but not to offer any serious re-
sistance to craft passing over them. They
can be so placed as to close so much of
the area of the channel as is necessary, to
prevent a discharge greater than is desired
for the minimum supply, which in the Ohio
at Pittsburgh is 1666 cubic feet per second,
but with one-half that amount 6 feet of water
can be maintained.

The time of construction, it is claimed,
will not exceed two years. Gen. Haupt's
plan is to secure the organization of a large
stock company, like the Eads Jetty Com-
pany, among the leading business men of
the Ohio Valley, for the purpose of contract-
ing with the government to improve the
Ohio.

The plan as proposed is meeting with con-
siderable favor along the Ohio Valley. The
coal famine of last fall at Cincinnati and the
Lower Ohio ports, has enforced the necessity
of the adoption of some system of improve-
ments that, in the shortest possible time, shall
effectually prevent the recurrence of such a
continuous period of low water as that for
which the summer of 1879 was noted. In
the meantime the Davis' Island Dam, which
is in course of construction just below Pitts-
burgh, and at which the Chanoiné wicket
will be tried, will be carried on to comple-
tion. This is necessary to give Pittsburgh
a harbor.

The melancholy news is flashed over the
wires from Washington that M. Leon Chat-
teau is packing his carpet bag and will at
once leave for France, shutting up his liter-

ary bureau, from which he was to send forth
a word of wisdom to enlighten the igno-
rance of this Western World. Hon. Wm. D.
Kelley is reported to have done all this with
his little resolution; and when Mr. Chotteau
read the story of the father of this country
on Sunday a week ago, he concluded to go
home and tell the truth to his countrymen,
which is that nothing can be done with the
ungrateful and perverse American Congress.
He words it that Mr. Evans can do nothing
until he is officially informed of the inten-
tions of the French government. As the
French government probably have no inten-
tions in the matter, M. Chotteau being a self-
appointed envoy, we shall probably hear but
little more of his commercial treaty.

The Piercing of the St. Gothard.

One of the great engineering works of the
present century, the piercing of a second
great tunnel through the Alps, was carried
to a successful issue on the 29th of February,
when the workmen from the two ends of the
excavations under the St. Gothard were
able to shake hands with one another miles
away from the surface of the earth. Modern
progress in engineering science has
stripped such enterprises of much of their
uncertainty, and therefore the conception of
works like the St. Gothard tunnel ap-
pears to us now a matter hardly deserving
particular attention. When, however,
between 1850 and 1860, an Italian and a Swiss
engineer, Locchini and Mueller, first ex-
amined the topography of the St. Gothard,
and reached the conclusion that the under-
taking was practicable, their statements
were received with much doubt. Their
work was continued by Wetli, and later, in
1863, Dr. A. Escher, prominently connected
with the Swiss railroad system, caused more
extended and elaborate technical and finan-
cial examinations to be made by engineers
Gerwig and Berkh, whose labors resulted in
the recommendation of a tunnel between
Airolo, on the Italian side, and Goeschenen,
on the Swiss side. Meanwhile the Italian
government decided to inquire into the
feasibility of the plans proposed, and in 1869
united with the Swiss and the German gov-
ernments to determine by treaty the basis
upon which the three countries would co-
operate in pushing the enterprise to an issue.
The Franco-German war caused a suspen-
sion of these deliberations, and it was only
in October, 1871, that the organization of
the St. Gothard Railway Company be-
came possible. Early in the spring of
1872 bids for the execution of the tunnel
were called for. Seven in all were re-
ceived, of which two only were seriously
considered—one made on the part of an
Italian company, the other coming from M.
Louis Favre, of Geneva. The latter was
accepted on the 7th of August, 1872. It was
somewhat modified during the years follow-
ing, so that the contract price rose to
\$9,700,000, the time for completion being
limited to eight years. The agreement en-
tered into by the parties provided for a pen-
alty of a little less than \$1000 a day during
the first six months following the 7th of
August, 1880. If the tunnel should not be
completed at that date, this penalty is to be
doubled for the succeeding six months, and
if the tunnel is not opened for traffic by the
1st of October, 1881, a security of \$1,500,000,
deposited by M. Favre, would be forfeited.
The early connection of the work prosecuted
from both sides will probably secure the
contractors against loss by these provisions,
and possibly the bonus of \$1000 a day for
completion before the 7th of August may be
obtained for a short period. It must not be
forgotten, however, that while the advance
heading is now carried through, the other
portions of the work are still considerably
behind. As in all large tunnels, the work
in the St. Gothard advances in sections.
Following the Belgian system, a heading
near the top of the arch is driven in ad-
vance, and this is followed further back by
an enlargement to both sides, bringing out
the full section of the upper part of the
tunnel. The lower bench is then proceeded
with in a similar manner. The tunnel sec-
tion was thus taken out in two levels at the
Goeschenen side, while at the Airolo side
three were found to be necessary. Excava-
tion is followed by timbering, and this is
succeeded by the arching, so that, entering
the tunnel at one portal, each stage is suc-
cessively passed through. The dimensions of
the St. Gothard tunnel are large enough to
accommodate a double track of standard
gauge, the width at the level of the sleepers
being 24.93 feet, and the height 19.68 feet.
The tunnel is on a tangent for the greater
part of its length, only 476 feet at the
Airolo end being on a curve of 984 feet ra-
dius. The total length, when completed,
will be 48,837 feet, or 9.26 miles—consid-
erably more, therefore, than either the Mont
Cenis (40,084 feet), the Hoosac (25,040 feet),
or the Sutro (20,370 feet). Although the
tunnel passed through hard ground through-
out, and at the Airolo end through a wet and
difficult formation, its cost was considerably
less than that of earlier works of the same
kind, owing, to a certain extent, to improved
methods of excavation, which also largely
reduced the time. The Mont Cenis tunnel,
which may best serve to show the advance
of modern tunnel work—because cost of
labor, &c., were not so widely differ-
ent—cost \$15,000,000 and required thir-
teen years, while the Hoosac cost \$13,-
000,000 and took eleven years from the
time when work was properly begun. It
should not be forgotten, in the case of the

latter work, that the cost of labor, machinery and materials is vastly greater than it is in the case of the European enterprises cited. Among the chief engineering features adopted in the construction of the St. Gothard was the use, almost from the outset, of rock-drilling by machinery and blasting with high explosives. Water power being available, M. Colladon, a well-known Swiss engineer, was called upon to design an extensive air-compressor plant, which at the present time comprises nineteen compressors, driven by turbines at each end of the tunnel. Experience at the St. Gothard has contributed much toward the introduction of power drills, and various types of the Sommeiller, Dubois-Francois, McKean and Ferroux drills were successively used, by the aid of which a monthly advance of from 400 to 440 feet was reached, in rock composed chiefly of granitic gneiss and various granitic and micaceous schists.

The commercial importance of this great work for Central Europe cannot be overestimated, while for Switzerland its completion has become a question of vital importance, the piercing of Mont Cenis having diverted much of the traffic to French roads. The St. Gothard Railway forms the shortest line of transit between the Mediterranean and the Valley of the Rhine, and will be one of the greatest arteries of trade of the Continent, carrying all the transportation and travel between Italy and Switzerland, Northeastern France, Western and Central Germany and Northern Europe. It will probably carry the great East India mail between Great Britain and her Eastern Empire, via Brindisi, Italy and the Suez Canal. Two of the great Alpine passes have thus been superseded by the work of modern engineering, and it is only a question of time when Austria will follow the lead of her neighbors and commence the work of piercing the Simplon.

The Reciprocity Idea in the British Parliament.

Our English correspondent gives an interesting summary of the debate in the House of Commons on February 13th, over Mr. Wheelhouse's resolution for the appointment of a select committee "to consider the commercial relations existing between England and foreign nations, especially with regard to the import of manufactured goods, as well as the effect of our system of one-sided, so-called free trade, with a view, if possible, of permanently ameliorating the position of the wage-earning classes of this country." The debate seems to have been rather short and unsatisfactory, and when the result of a vote on the resolution was announced as six for and seventy-five against it, we are told the majority hailed it with "derisive cheers and ironical laughter." Our correspondent intimates that this was a result which might have been expected under the circumstances, but that the reciprocity agitation is likely to be renewed with a very different result when the nation shall enter upon its next period of depression. No doubt this is true enough, but it is by no means clear how Great Britain can so shape a policy of protection to her industries as to derive any benefit therefrom. Her misfortune is that she cannot find markets for her surplus of manufactures. If she were strong enough to dictate the tariff legislation of other countries, she would settle the most serious of her difficulties in short order. But her "wars of the yardstick"—wars declared and waged in the interest of her export trade, and with no regard for the rights or interests of any one else—are practicable only in the case of such semi-civilized countries as those which, during the past few years, have engaged the attention of her army and navy. Could her dream of universal free trade be realized, England would again dominate the commerce of the world, but such dominion has passed away, and no nation will ever again enjoy the industrial monopoly which belonged to England from 1840 to 1860. Other countries are finding, or have found, that it does not pay to raise raw materials and let England manufacture them, but that it is possible to develop and diversify their own industries by a policy which is hurtful only to England. Her people are powerless to avert the operation of causes which are changing the whole course of the world's trade, and it is more than probable that as England is in the position of a competitor with all the world, she will find the odds against her too great to be overcome. But such tariffs as she might impose upon her imports would not help her. Her industries are now expanded to a point which would enable her to supply the requirements of more markets than are opened to her. Looking beyond the immediate future, the outlook for Great Britain is certainly far from bright.

A new phase of the hoop-iron controversy has developed during the past week in Pittsburgh, and one that promises to add to the bitterness of the discussion on both sides. The workhouse of Allegheny County is engaged in the manufacture of barrels, for which the Standard Oil Company are the largest customers. The managers asked for bids for furnishing the hoop iron needed, and the Standard Oil Company were the lowest bidders this year, as they were last year. The bid of the Standard was 4 cents a pound—just the card rate on common bar iron. The bids of the Pittsburgh manufacturers ranged from 4.3 to 4.7 cents. In the contract with

the Standard last year it was provided that Pittsburgh iron should be furnished, and at the demand of the Standard this was stricken out this year, which will enable the Standard to supply the contract from the English iron they are reported to have bought. The amount required will be from 1300 to 1600 tons. It will be a queer sight to see an institution supported by Pittsburgh taxpayers using English iron in its shops. The wisdom of the Standard Oil Company in insisting on the striking out of the clause requiring Pittsburgh iron is questioned. It is a corporation that is regarded with very little favor, and it has just compromised an ugly conspiracy suit. Gen. Butler is urging Congress to appoint a committee to investigate it and its acts, and now to incur the ill-will of the iron manufacturers is hardly a wise course.

Iron from Under Cleopatra's Needle.

Concerning the piece of wrought iron taken from under Cleopatra's Needle during the process of removal for shipment to this country, Mr. A. L. Holley has sent the *World* some facts of general interest. It will be remembered that a report of an analysis of a fragment of this iron made by Dr. Wendell, of Troy, was published in our issue of February 19, in our report of the proceedings of the American Institute of Mining Engineers. Concerning the probable method of its manufacture Mr. Holley says:

If we had not known from the general history of the iron manufacture that the specimen must have been made by the Catalan process, the analysis would have so indicated. The notable facts are: About half a per cent. of carbon, giving the hardness of ordinary rail steel; very low silicon and phosphorus, due to the method of manufacture, and a remarkably large amount of calcium, indicating the plentiful use of lime as a flux in the process. The small amount of slag (for a Catalan product), as well as the fine fracture, indicates frequent reworking. The Catalan process is simply subjecting to a high red heat pulverized iron ore mixed with charcoal, enough to combine with its oxygen. The product is a pasty mass of iron which is substantially pure chemically, excepting the little carbon it has got out of the fuel, but which is mechanically mixed with silica, phosphate of lime, alumina and other impurities the ore had. By repeatedly heating the mass to a plastic condition and hammering it, this dirt is pretty well expelled, and the product, although costly, is excellent wrought iron. This process is still in use where ore and charcoal are very cheap, but the modern soft steels have almost displaced it as a material for boiler plate and other fine products. Yet, curiously enough, as Catalan iron is supplanted by steel, the Catalan process is coming into still greater use to furnish material for open-hearth steel. The pasty mass above described quickly melts in the cast-iron bath of the open-hearth furnace, and the mechanical impurities float off as slag. Dr. Siemens' modern improvement of the Catalan process—performing it in a steam-rotated regenerative gas furnace, and on a very large scale—produces so cheaply that it is likely to furnish most of the material for fine open-hearth steel. Thus the prehistoric method, facilitated by modern engineering, is coming again to the front.

Concerning the date at which this piece of iron is made, there is as much uncertainty as attends the age of the Masonic emblems found in the same place. The probabilities are that it is by no means as old as the obelisk, which is known to have been moved at least once, and what has lately been found under it was probably put there at that time.

The American Hand Pump.

The manufacture of pumps and apparatus for raising water is one of the most extensive industries in the United States. For convenience and cheapness the American domestic pump can hardly be improved. The wants of the people in every section of the country have been made a most careful study, and we cannot at the present moment think of a condition or situation involving the moving of water by hand power, which has not been very perfectly met. In capacity, they range from powerful pumps needing the full strength of a man to work, and delivering almost five quarts at a stroke, to little affairs which a child can work, and which deliver half a pint at a stroke. In price there is little to be desired, since for from \$5 to \$5.50 a pump can be obtained capable of lifting a quart of water at every stroke from a well or cistern of moderate depth, while smaller sizes can be obtained for prices as low as \$3.50 or \$4. In looking over catalogues of pumpmakers and watching the inventions of those who are engaged in bringing out new things in this line, one cannot fail to be struck with the fact that the improvements are of the smallest and most trifling kind. In other words, we find that the hand pump is, in many respects, almost perfect. Examining one of these pumps, we see that an immense amount of practical ingenuity has been expended upon it. Spout, handle, plunger, stand, and means for coupling have all had a great deal of thought bestowed upon them. To a person unskilled in the mechanic arts, one of these pumps would seem to be the very incarnation of simplicity. But simplicity, ease of manufacture, and consequent cheapness, are not to be obtained without the most careful study.

It may be accepted as an axiom, that simplicity marks the great inventor and distinguishes his work from that of the inferior man. Taking the ordinary American outdoor pump, such as may be placed upon a platform over a well, we find that we may have the handle at either side or at the back; that it can be used in a well varying from 3 to 90 or 100 feet in depth; that it is equally useful in driven or dug wells, and that it is capable of doing almost any work which may be required of

it. Its durability seems to be beyond the knowledge of any one generation, for we find that when apparently quite worn out by hard and constant use, a few trifling repairs, which can be obtained from almost any tin-smith's shop, puts the pump into as good condition as when it was first set up. In cold climates no fear of freezing need trouble the user, for by simply lifting the handle the valve is tripped and the water drains from all portions of the pump back to the well. It must be understood that we are now speaking of the characteristics of all American yard or well "suction" pumps. They are to be found in the lists of every manufacturer in the country, so far as we know. There are probably more of them made than of any other kind, and they are known in almost every corner of the world—certainly in every civilized country.

The next great class is that known as the force pump. Although this kind does not invariably permit a change of handle from side to side, it may be found with most of the conveniences of the other type. The variety of hand force pumps is, however, much greater than that of any other style. In them, too, the amount of power required is much greater, and the losses encountered by the water in passing through them becomes a serious matter, while in the general form and arrangement there is very little more to be desired than small points of internal construction that should have the most careful attention from the manufacturer.

The first point, when pumps of this class are defective, is in the size of the suction opening. This is usually very much contracted, and is frequently located so that the water takes a sharp bend soon after entering the pump. This is most frequently the case with all kinds mounted horizontally. For convenience and cheapness of manufacture the valve seats and valves are made as small as possible, and very frequently, when brass seats are used, the lower sides have sharp edges projecting into the water-way, so that while nominally it is without a contraction, practically the valve seat offers nearly as much resistance to the flow of the water as if the stream passed through a hole in a thin plate. Right-angle bends across sharp edges of castings are very often found, which take off large percentages from the theoretical capacity. In ordinary use, to supply water in dwellings or for stock, a little more or less loss of power may not be noticed; but when it is necessary to fill a tank, as is common in cities, or when a stream is required for washing carriages or putting out a fire, every ounce of power wasted becomes a serious matter.

A change in the construction of our pumps is absolutely necessary when they are to be used for raising large quantities of water. The construction would have been modified long ago had the manufacturers felt the need of so doing. The public who used pumps had no care whether half or only a quarter of the power expended in pumping was wasted. As communities become older and their needs greater, water raising becomes more important. Larger quantities of water are required, and the power needed becomes costly. We may expect, therefore, that as more attention is paid to the question of pumping, we shall have the internal construction of the pumps so modified as to make the work as light as possible.

At the present time the amount of power required to lift a given quantity of water through any required number of feet, is usually about 15 or 20 per cent. more than theory would call for. There is no less than 15 per cent. wasted in overcoming the friction of the pump, the losses by water slipping through the valves, and by the friction of the water in the pipes. This amount is much greater than is really necessary, and by proper construction may probably be reduced to one-third of its present amount, or even less.

In the matter of materials for pumps and pipes, there is some room for improvement. The common cast-iron body, with its leather valves and iron or brass valve seats, is all that could be desired under ordinary conditions; but we find that in driven wells there is a growing tendency to use galvanized iron, because the pipe does not rust. Probably with the introduction of iron pipes, well protected from rust by some other means, the use of galvanized pipe will be gradually abandoned. Certain manufacturers, in order to diminish the annoyance from rust, which in some waters is considerable, line the inside of their pump cylinders with glass, and thus obtain a non-corrosive surface. These cylinders are said to last very well. Wooden pumps almost deserve an article by themselves. Seventy-five years ago wood was largely used for pump-making in the Eastern States. Pine was the timber generally employed, and each log made a single pump. At the West the manufacture of wooden pumps reached a much greater degree of perfection, and they are still made in great numbers. The reason for the persistence of the manufacture at the West rather than in the East, is probably to be found in the fact that the West has a most excellent wood for the purpose. It is called by the trade "cucumber wood." The local name is "poplar," but it is not a poplar, nor in any way related to the botanical family to which the poplar belongs. The "cucumber-wood" pumps are made from the *Liriodendron tulipifera*, or tulip tree. It belongs to the well-known magnolia family, of which the cucumber tree is a member. The latter, however, is very different from

the tulip tree, and is not nearly so large. The poplars, or aspens, belong to the *Salicaceae*, or willow, family, and their wood is almost valueless under water. The wood of the tulip tree, however, seems entirely unaffected by water and wears remarkably well.

Instead of one pump from each tree, a great number are obtained by means of improved methods of manufacture and improved machinery. Most dealers in pumps can supply wooden pump tubing. It is usually square upon the outside. The water-way, however, is circular. Some tubes, cut out with hollow augers, are circular both inside and out.

Wood is almost the only material used for chain-pump tubes. Pumps of this kind were at one time very extensively used, but for a few years past they have not been popular. Improved tubing, better buckets and chain are, however, very greatly extending their use. A rubber bucket has been invented which improves the action of the pump. Indeed, by its use only three or four are needed for a well 18 or 20 feet deep. This style of pump for use in dug wells and in cisterns deserves an even greater sale than it has had. Owing to the quantity of air it carries into the water, it has a tendency to keep the water sweet, while, at the same time, on small lifts it works easily and delivers a great volume of water.

With the single exception which we have noticed, it may be said that the water-raising apparatus for hand-power made in this country can challenge the world, both in cheapness and efficiency. It must be remembered that the faults which we have mentioned are only to be found in certain classes of pumps—those in most common use being free from them. We are inclined to think that in no other country in the world are hand pumps made in such numbers, so cheaply and so perfectly. It would seem that our manufacturers could easily command the markets of the world.

"History repeats itself" in regard to events in connection with industries, no less than in those relative to the affairs of nations. The old fight over the limitation of the number of apprentices and the rules to be observed in teaching trades to new men, which is as old as the English and French guilds, if not even more venerable, keeps cropping out in the trades unions of today, which are, in some measure at least, the successors of those guilds. We have before us a complaint of an iron worker in a Western rolling mill against the "crime" of teaching "green hands" to help at the puddling furnace. It appears from the complaint that it is against the rules, if not the oath of the Amalgamated Association, to do this.

NEW PUBLICATIONS.

THE ENGLISH WIRE GAUGE. By Thomas Hughes. E. & F. N. Spon, Publishers.

Mr. Thomas Hughes, of Greenfield, Holywell, in a little pamphlet accompanied by a number of plates of drawings and tables, enters upon the vexed question of the establishment of a standard wire gauge. He gives an historical review, in which he attempts to trace the origin of the wire gauge, and appears to have been at some pains to reach remote antiquity. His efforts are praiseworthy and his results satisfactory; but we fear that misguided zeal has carried him beyond his depth, and that his style is not equal to the demands of modern critical historical essays. He says: "Vulcan, to expose Mars and Venus, made a wire net on his anvil in his forge, with hammer and files, so fine that it could not be seen—delicate as a spider's web, that even the gods could not see it. A spider's web is made of threads 1-25,000th of an inch in diameter. This wire of Vulcan production is no doubt a superlative expression, to show its extreme fineness; but we learn from it that fine wire was made by the slow process of hammering and filing at that remote period." Though not particularly fortunate in his language, Mr. Hughes adduces a number of interesting proofs to show that the wire gauge was originally intended as a guide to the wire drawers in carrying out the successive reductions of diameter, and that it was applied originally to iron wire exclusively. The object of Mr. Hughes's work is twofold: First, to establish the fact that the present bewildering variety of gauges used is conducive to fraud, is embarrassing to manufacturers and customers, and leads workmen to slovenly and unnecessary work, and, secondly, to press the adoption of a so-called "English Standard Gauge," advocated by him. The latter is based upon a table of averages of a large variety of systems. We are unable to see, nor does Mr. Hughes give any satisfactory reasons, why he does not go one step further and join in the efforts of those who, like the committee of the American Institute of Mining Engineers, wish to see a universal standard gauge agreed upon by all. The attainment of that object can only be retarded by attempts to create a national gauge; and we believe that Mr. Hughes, in view of the facts which he so elaborately produces, ought not to stop where he does, but strive for the greater aim, an international standard wire gauge.

A NEW GUIDE TO THE IRON TRADE. By James Rose. Published by the Mining Journal, 26 Fleet street, London.

Mr. Rose has undertaken a task which many of those operating American rolling mills have no doubt frequently had occasion to pore over. He has calculated, as far as an average rule will admit, the weight of iron required to produce boiler plates, sheet iron and flat, square and round bars, allowing for heating, rolling and cropping. Of course many circumstances, frequently occurring in practice, are apt to affect the quantity required, and local experience must guide the mill managers in making the necessary allowances. But for good hammered iron the figures given in the tables will be closely correct, and they will prove a valuable assistance in computing the quantities of other material also. An enumeration of the

subjects treated in the tables will probably best illustrate the scope of the work. Mr. Rose gives tables of the weight of slabs and of piles required to produce boiler plates from 2 to 18 feet long, and from $\frac{1}{4}$ inch to 1 inch in thickness; the weight of piles for sheet iron from 2 to 15 feet superficial measurement, and from No. 14 to No. 30 wire gauge in thickness; the weight of bars for sheet iron within the same range, and the weight of iron necessary to produce flat bars 1 inch, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, &c., to 8 inches, in all 32 tables, for lengths ranging from 2 to 18 feet, and thicknesses ranging from $\frac{1}{4}$ to 15-16 inch. A similar, though of course shorter series, covers square and round bars, while 34 tables give the details necessary in the manufacture of hoop iron. A number of tables of general interest add to the value of the work, which will no doubt meet with much appreciation on this side of the Atlantic also.

ON THE MOTION OF A SOLID IN A FLUID. By Thomas Craig, FR. D. Van Nostrand's Science Series, No. 49. Price, 50 cents.

An elaborate mathematical discussion of one of the great problems of hydro-dynamics.

THE THEORY OF SOLID AND BRACED ELASTIC ARCHES. By Wm. Cain, C. E. Van Nostrand's Science Series, No. 48. Price, 50 cents.

Mr. Cain, who has devoted much attention to the theory of arches, treats in the present essay, which originally appeared in *Van Nostrand's Magazine*, the complex theory of solid and braced arches, applied to arch bridges and roofs in iron, concrete or other material. He has chosen the graphical method, as presenting a more simple and practical means of solving the problems at issue.

LINEAGES. By J. D. C. De Roos. Van Nostrand's Science Series, No. 47. Price, 50 cents.

This little book, treating of a subject which has not received the full attention its importance deserves, is a translation from the French. The original essay, which appeared in the *Revue Universelle des Mines*, contains the description of combinations for the mechanical solution of equations of the higher degrees which are ingenious, and will be appreciated by those to whom they have been made accessible by the translation now before us.

ÖSTERREICHISCHES MONTAN-HANDBUCH, 1886. (Directory of the Mines and Metallurgical Works of Austria.) Manz'sche Buchhandlung, Vienna.

The Austrian Minister of Agriculture has just published the twenty-third volume of the directory of the mines and the metallurgical works of that empire, a handsomely bound book of more than 200 pages, containing an enumeration of the various works, the names of the officers of each, the number of men employed, furnaces, engines, &c., each establishment contains. The whole is admirably arranged for easy reference, and would prove a valuable aid to those seeking business connections with Austrian firms or establishments.

The Hoop Iron Duty.

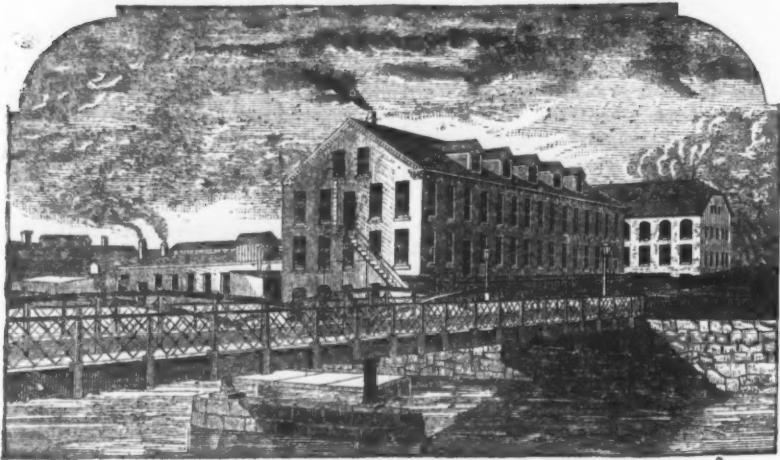
(From our Special Correspondent.)

WASHINGTON, D. C., March 1, 1886.

The Solicitor-General, Mr. Phillips, has completed his opinion on the points set forth in the letter of the Secretary of the Treasury, and published in this correspondence last week, respecting the ruling of the department on hoop iron cut to lengths. The paper is not long and will be transmitted to the Secretary of the Treasury to-day or to-morrow. The opinion will still be subject to the approval of the Secretary and a department order for its execution. The nature of the decision will not be divulged until after it has reached the Secretary of the Treasury and received his approval. It is evident to your correspondent, after conversation in authoritative quarters, that the opinion of the Solicitor-General is favorable to the manufacturers. This impression is based on the general views, expressed in a conversational way, upon the important interests involved, and the necessity of protecting, by simple and inexpensive means, home industries against articles being taken out of their rightful schedule and placed at a lower rate through evasive methods of preparing them for the market. In examining the early litigation on this question of the duty on hoop iron, it was found that as far back as 1864 cut hoops were mentioned in the list of articles of import. A case was also found which presented some singular features, showing the eccentricities of duties. It appears that a question somewhat similar to that pending on hoop iron was before the Supreme Court of the United States, and sharing the fate of cases before that tribunal, was delayed by prior cases on the docket. The government was pressing for a restoration to specific duty on the article. Pending these delays, however, the price of the article rose so enormously that the ad valorem duty realized more than the specific. When the case was reached the government found itself contending for a lower rate of duty by claiming the specific tax, while the importers a higher by asking the retention of the ad valorem. The government withdrew the suit, it appears, and continued to collect the revenues at the ad valorem rate. There is little doubt, if the opinion comes to the Secretary of the Treasury in support of the specific duty on hoop iron, even if cut to lengths, that he will approve it. The impression produced by the letter of the Secretary of the Treasury, published in *The Iron Age* last week, it will be observed by any one upon a careful reading, is that he favors the specific rate, and that the article (hoops cut to lengths) is simply an invention of the importers to evade the proper duty.

The Assistant Secretary of the Treasury, Mr. French, is inclined to free-trade notions, and in his rulings has uniformly decided in favor of lower rather than the maximum duty allowed by the schedules. Before the question of the proper duty on hoop iron cut to lengths is formally promulgated, Mr. French will have a conference with the Secretary of the Treasury, when the opinion of the Solicitor-General will receive a careful examination.

SEYMOUR'S SHEARS AND SCISSORS.



HENRY SEYMOUR CUTLERY CO.,

MANUFACTURERS OF

Full Nickel Plated and Maroon
Japan Handle

Shears & Scissors

EVERY PAIR WARRANTED.

Sold by Hardware dealers throughout the country.

Salesrooms,

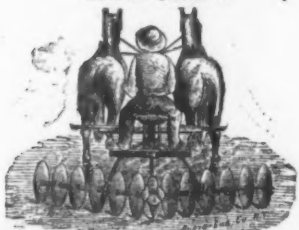
84 and 86 Chambers Street, New York City.

Manufactory, HOLYOKE, MASS.



NEW YORK STATE AGRICULTURAL WORKS, Established 1830.

LA DORR'S



Jointed Pulverizing Harrow.



Eagle Rake.

WHEELER & MELICK COMPANY,

Patentees and Manufacturers of

Railway & Lever Horse Powers, Wheeler's Vibratory Threshers & Cleaners.

Ellis's One and Two-Horse Threshers and Cleaners, Threshers and Shakers, Straw-Preserving Rye Threshers, Eagle Hand and Horse Dumping Rake; La Dorr's Jointed Pulverizing Disc Harrow, the only Disc Harrow that will thoroughly pulverize the ground, leave it smooth and cover the seed; Tolley's Champion One and Two-Horse Cultivator with patent screw teeth Steam Engines, Dog and Pony Powers, Wood Sawing Machines, Shingle Machines; La Dorr's Disc Corn Cultivator, unequalled by anything for cultivating corn or any rowed crop. All machines made of first-class material, and are the best machines for export and home trade. Having been established nearly fifty years, our reputation is second to none.

Send for illustrated circular and report of Centennial Trial.

WHEELER & MELICK COMPANY,

Albany, N. Y., U. S. A.

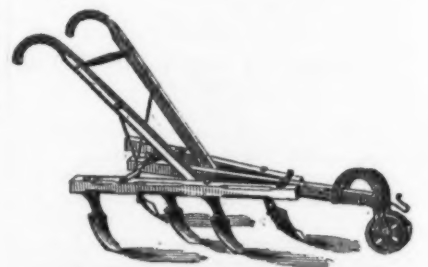
WHEELER'S

MEDAL MACHINES.

NEW YORK STATE AGRICULTURAL WORKS.



Horse Power and Thresher and Cleaner.



Tolley's Champion Cultivator.

THE HARTFORD AUTOMATIC PUMP

Water Driven to any Hight and Distance by Compressed Air.

Country Houses Supplied Cheaply and Certainly for Bath Rooms, Water Closets, Hot and Cold Water Faucets, &c.

Plenty of Fresh Water for Stock on Farms.

The Best Pump for Irrigating, Supplying Railroad Tanks and for Mining Purposes.

This pump is being introduced into all the foreign countries, and is accepted by all mechanical men as the very best Pump in the market. It is more durable and needs less repairs than any other apparatus for like purposes, and is therefore the cheapest in the end, if not at first. Its advantages over other Windmills, Rams, and other contrivances for raising water, are quickly seen. For Circular and Price List address

EZRA BROOKS, Manufacturer,

HARTFORD, CONN., U. S. A.



End View of Track.

Made of two pieces.

All Wood Track.

Patented April 30,
1878.Reissued July 8,
1879.THE KIDDER
SLIDE DOOR HANGER.

No Iron Rail and Cannot be thrown off the Track,

Thereby saving great annoyance to the user and cost of iron rail. The small anti-friction wheel keeps the door in place, preventing side friction. The Hanger can be put up in less time, runs with less noise and as easily as any other hanger made. For sale by the Wholesale trade generally, and the

KIDDER SLIDE DOOR HANGER CO., Romeo, Mich.



"The Diamond."

Cuts a round hole easily and quickly, and is made of such superior material that the blade does not become dull, as is the case with all round hole cutters introduced heretofore. The blade is readily adjusted to cut a circle from 2 1/2 to 3 1/2 inches in diameter.

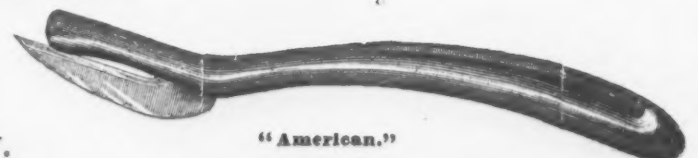
CAN OPENERS.

The illustrations represent three different styles of Can Openers made by us. We desire to "close out" stock on hand and cease making. In lots of 10 gross and upward we will sell at very low prices.

SPRAGUE NOVELTY WORKS, Rochester, N. Y.



Iron Handle, "No. 5."



"American."

CROSS CUT SAWS.

Caution to Manufacturers of, Dealers in, and Users of Cross-Cut Saws and One-Man Cross Cuts:

Dealers in and Manufacturers of Saws, and Hardware Dealers generally, are hereby notified that the undersigned are the owners of the reissued Patent for Saw Handles, No. 8996, Nov. 18, 1879, original patent, Jan. 18, 1870.

Every Cross-Cut Saw having a handle, part of which, adapted to one hand, is above the blade, and part, adapted to the other hand, opposite the end of the blade, is an infringement of the said patent, and prompt legal proceedings will be taken against manufacturers of and dealers in saws provided with such handles.

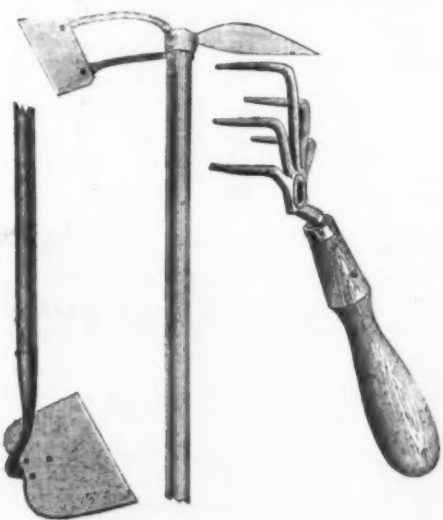


The following is the claim on which we rely:
"In a cross cut saw, the combination of the saw-blade with a handle, part of which, adapted to one hand, is above the said blade, and part, adapted to the other hand, directly opposite the end of the said blade, all substantially as set forth."

HENRY DISSTON & SONS,

KEYSTONE SAW WORKS, Philadelphia, Feb. 17, 1880.

HOWSON & SON, Philadelphia and Washington, Attorneys for Disston & Sons.

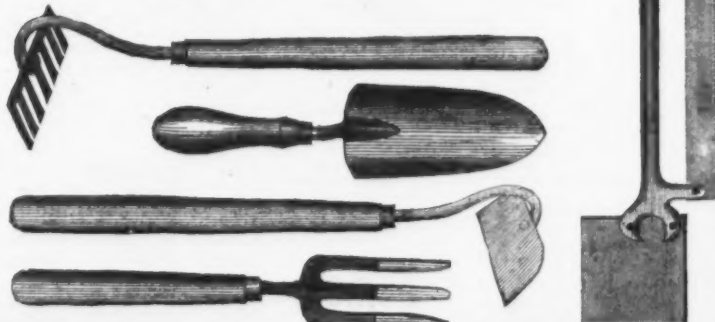
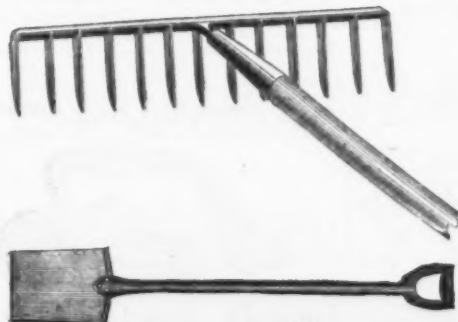


C. W. Dunlap & Co.,
43 CHAMBERS ST., NEW YORK.

MANUFACTURERS OF ALL KINDS OF

GARDEN TOOLS

Catalogues furnished on application.



COLEMAN EAGLE BOLT WORKS

ESTABLISHED 1845.

WELSH & LEA.
NORWAY IRON CARRIAGE & TIRE BOLTS,
AXLE CLIPS, &c.

Highest and only Awards and Medals, Philadelphia, 1876, and Paris, 1878.

WORKS, Columbia Avenue, Hancock and Mascher Streets.

OFFICE, 145 Columbia Avenue (late 2030 Arch St.)

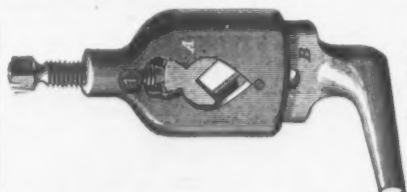
PHILADELPHIA, U. S. A.

W. & J. TIEBOUT,

Manufacturers of

Brass, Galvanized & Ship
Chandlery Hardware,

No. 290 Pearl Street, New York.



Universal Lathe Dog.

It is very strong. Holds very strong. Will not deface finished work. Holds round, square or irregular work. Always stands up square with the work and will not "skew." Is more evenly balanced than the common dog.

SELDEN C. NORTH, No. 347 North Fourth Street, Philadelphia, Pa.

The Work of the Hancock Inspirator.

Among the feed apparatus for boilers, generally classed under the head of injectors, the Hancock Inspirator, the construction of which is shown in the accompanying illustrations, occupies a special position. It has a separate attachment for raising the water and delivering it to the injector proper, or forcing attachment. The operation of the machine will be readily understood by an inspection of the sketch, the arrows indicating the course of the water and steam respectively. In a lifting attachment, it is desirable that the steam should expand on entering the combining tube, and that is generally accomplished, as in this machine, by enlarging the steam supply tube from the point of admission to the point of discharge. Although both the lifting and force nozzles are fixed, their proportion one to the other is such that the inspirator requires no adjustment for changes in steam pressure or water supply, the waste valve being kept closed while the instrument is in operation, except at the time of starting. The upper stop valve shown in the drawings (No. 2 in Fig. 2) controls the admission of steam to the forcing nozzle, while the valve No. 1 in Fig. 2 determines the course of the water delivered by the lifting jet. If the water supply is to be varied, this can be effected by partially closing a valve in the water supply pipe, without throttling the admission of steam; or both the steam and the water may be throttled. In practice, however, the delivery is varied by throttling the water supply. Whatever changes of adjustment are made, whether of steam or water supply valves, within the capacity

of the Hancock Inspirator, the construction of which is shown in the accompanying illustrations, occupies a special position. It has a separate attachment for raising the water and delivering it to the injector proper, or forcing attachment. The operation of the machine will be readily understood by an inspection of the sketch, the arrows indicating the course of the water and steam respectively. In a lifting attachment, it is desirable that the steam should expand on entering the combining tube, and that is generally accomplished, as in this machine, by enlarging the steam supply tube from the point of admission to the point of discharge. Although both the lifting and force nozzles are fixed, their proportion one to the other is such that the inspirator requires no adjustment for changes in steam pressure or water supply, the waste valve being kept closed while the instrument is in operation, except at the time of starting. The upper stop valve shown in the drawings (No. 2 in Fig. 2) controls the admission of steam to the forcing nozzle, while the valve No. 1 in Fig. 2 determines the course of the water delivered by the lifting jet. If the water supply is to be varied, this can be effected by partially closing a valve in the water supply pipe, without throttling the admission of steam; or both the steam and the water may be throttled. In practice, however, the delivery is varied by throttling the water supply. Whatever changes of adjustment are made, whether of steam or water supply valves, within the capacity

The following table gives the results of experiments made to ascertain the highest temperature (column 2) admissible for supply water lifted 2 feet at pressures of steam varying from 15 to 150 pounds (column 1). The temperature of the water delivered when the supply water is at the highest admissible temperature is given in column 3.

1	2	3	4	5	6	7	8	9
15	100.1	60.5	0.604	103	...	...	...	...
20	104.6	60.8	0.581	110	...	...	...	...
30	118.3	53.1	0.473	126	124	...	...	...
40	117.9	50.3	0.503	140	138	...	...	...
50	127.1	61.1	0.481	153	151	...	...	...
60	134.4	65.5	0.480	154	153	...	...	...
70	140.1	70.9	0.506	177	177	...	...	...
80	147.2	78.1	0.531	176	174	...	...	...
90	144.5	...	...	191	230	168	236	90

By some additional experiments it was found that the maximum temperature admissible for the supply-water was practically the same, whether the inspirator was working with a minimum or maximum delivery.

Delivering water against a pressure equal to that of the steam, the temperature of supply-water being 60 degrees, and the lift 2 feet, the lowest pressure at which the inspirator would start was 12 pounds per square inch with a free supply, and 9 pounds with the supply throttled. Once started, and delivering under a free discharge, the inspirator continued to work as long as there was any indication of pressure on the steam-gauge. Delivering against a water pressure of 5 pounds per square inch, the inspirator continued to work until the steam pressure was reduced to 1 pound. The time required for starting, when both the instrument and the supply-pipe were heated, by allowing steam to flow through for a short time, varied from 16 1/2 to 6 1/4 seconds according to the temperature of the supply-water. The amount of water wasted, in starting a locomotive inspirator, averaged 1.15 quarts. Efforts to stop the injector while at work by jarring and striking the supply, and thus breaking the jet, succeeded only in one instance. By additional experiments it was shown that a strong reduction of steam and water pressure does not affect the working of the inspirator, and that it is capable of working with lifts of 25 feet or even more, at a range of pressure varying from 50 pounds to a point where there is no longer any indication of pressure in the steam gauge, the instrument being very prompt in starting. The Hancock inspirator, for which G. W. Storer, 140 N. Third street, Philadelphia, is general agent, is well adapted to raising water to a moderate height, using for this purpose the lifting side only, which increases the temperature of the water but little. For forcing water to a considerable height both sides are used, the quantity of water depending upon the steam pressure. The perfect working of the machine depends upon the following conditions, viz., a tight suction pipe; an ample supply of water, with a lift not exceeding 25 feet and a temperature not exceeding 100 degrees; and for a low lift not exceeding 150 degrees, with a steam pressure not less than 30 pounds for a 25-foot lift, and from 5 pounds upward for a low lift.

Recent Commercial Decisions.

Interest.—A discount of 15 per cent. is allowable if the transaction is a sale of paper, but not if it is an exaction of interest.—*Smith vs. Hart*, Supreme Court, Mich.

Bill of Exchange.—A writing as follows: "D. & Co., bankers, pay to the order of—, on sight, two hundred dollars in current funds, E. L." is not a check, because no payee is indicated by it, and no action on it can be maintained against the drawer on its non-payment.—*M'Intosh vs. Lytle*, Supreme Court, Minn.

Location of Contract.—A promissory note dated as of a place in Maine, and delivered to the holder, by a letter mailed at a place in Massachusetts, at which place the note was signed, is a contract made or executed in Maine.—*Bell vs. Packard*, Supreme Court, Maine.

Exemption of Condition.—A promissory note was made payable in specie on a certain day "on condition that the banks of the State have resumed specie payments at that time, if not, as soon thereafter as they do resume specie payment." The banks not having resumed at that day, it was held that the holder of the note might waive payment in specie and recover the amount of the note in currency—the condition exempting the maker only from payment in specie, and not from all liability.—*Walters vs. M'Bea*, Supreme Court, Tenn.

Collateral Security.—A creditor who takes a negotiable note before maturity, so indorsed that he becomes a party to the instrument as collateral security for a pre-existing debt, in consideration of an extension of time to the debtor actually granted, is, according to the "law merchant" a holder for value, and his acts as such are not effected by equities between antecedent parties of which he had no notice.—*Oates vs. First National Bank*, Supreme Court, U. S.

Limitation of Partnership Liability.—A note was given by a debtor to an execution creditor to obtain a release from a levy, and was indorsed in the name of a firm by one

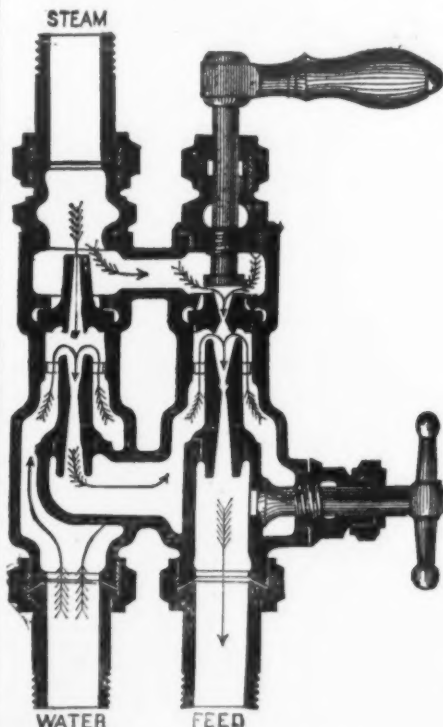


Fig. 1.—Section of the Hancock Inspirator.

of the inspirator, the instrument will continue in operation with the waste valve closed. In this respect the inspirator differs materially from fixed nozzle injectors, which cannot be operated with the waste closed, under the conditions recited above.

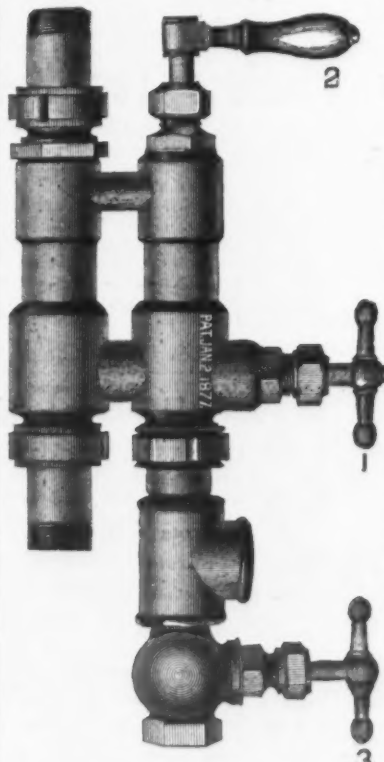
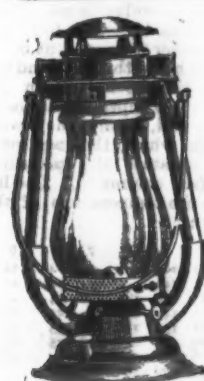


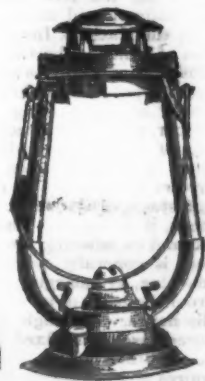
Fig. 2.—Side View of Hancock Inspirator.

An elaborate series of experiments were made with the Hancock Inspirator No. 30, by Park Benjamin's expert office, for publication in "Appleton's Encyclopedia of Applied Mechanics," from which we take the following data: It should be noted that as the boiler used in these experiments was small, and, therefore, unfavorable to the performance, the results obtained are the highest attainable under the best conditions. In the following table are given, for the pressure of steam supplied to the inspirator and the pressure against which it delivers water (see column 1); the maximum delivery of water, cubic feet per hour, for the pressures noted in column 1 (see column 2); the minimum delivery of water when the steam valve is wide open, and the supply throttled (column 3); the ratio of minimum to maxi-

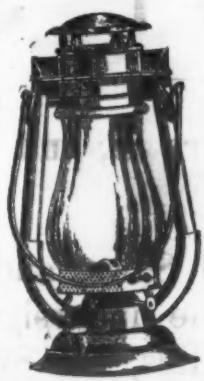


MILLER'S NO. 13 LANTERN

Gives more light and will hold the flame more perfectly than any other Lantern made.



For Prices and Samples, address
Edw'd Miller & Co.,
Meriden, Conn.,
OR
35 Warren St.,
New York.

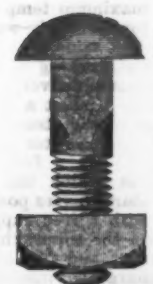


Manufacturers of
Lanterns,
Brass Kettles,
Machine Oilers,
Kerosene Goods,
Tinners' Trimmings,
&c., &c.



WM. H. HASKELL & CO., Pawtucket, R. I.

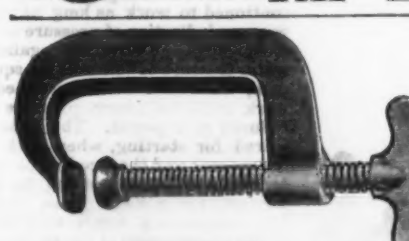
MANUFACTURERS OF



COACH SCREWS

(With Gimlet Points),
ALL KINDS OF

Machine and Plow Bolts,
FORGED SET SCREWS,
AND
TAP BOLTS.



Wood Workers' Clamps,
To open 2, 3, 4, 5, 6, 7, 8 and 10 inches.
Strongest and Best Clamp Made.
Malleable Ox Shoes
with
Steel Converted Toe Calk.
Five sizes.

CARRIAGE HARDWARE,
IVES, WOODRUFF & CO., Manufacturers,
(Send for Catalogue.)
MT. CARMEL, CONN.

MERIAM & MORGAN PARAFFINE CO.

CLEVELAND, O.,
Manufacturers of



Cold Pressed Paraffine Oil,
Refined Paraffine Wax,
AXLE GREASE,
And a full line of
Railway, Machinery, Signal and
Miners' Oils.



BRANCH OFFICES:
33 Oliver Street, Boston.
143 Front Street, New York.

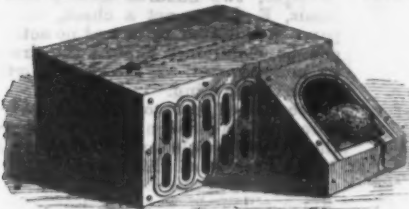
AXLE GREASE AGENCIES:
Robinson, Lord & Co., New York.
Ferris & Avery, Chicago.



Peerless Tea Kettle.

The most durable and handsome kettle in the market, having the breast, sides, and a strengthening portion for the spout all spun from one piece of sheet metal and double-seamed to the pit, so that the seam is brought under the sides of the kettle, forming a strengthening rib of four thicknesses of metal, at the point of greatest wear, upon which it rests when on the stove. By this means the objections to all other copper kettles are overcome. Sole manufacturers,
SUNDY MFG. CO., Buffalo, N. Y.

Delusion Rat and Mouse Trap,



Formerly manufactured by
CLAUDIUS JONES & CO.,
At Bridgeport, Conn.,
Have Removed to ERIE, PA.
This is the most successful Rat and Mouse Catcher on the market.
Send for Price List.

HUNTER'S ROTARY SIFTERS.



Mixer, Scoop, Measure, Weigher, Egg Beater, Rice Washer, Tomato, Pumpkin, Starch, Wine and Fruit Strainer.
The greatest combination known, and pronounced by press and public the only first-class sifter in the world. Made better, of better stock, sifter much faster, and saves more material than all other sifters. Made in two sizes: No. 1, 3 pts; No. 2, 5 pts. Liberal discount to the trade. Please mention this paper, and send for illustrated Price List.
J. M. HUNTER & CO., Sole Manufacturers and Owners,
30 Emory Arcade, Cincinnati, Ohio.



J. J. Shannon,
1707 Market St.,
PHILADELPHIA.



Bemis & Call Hardware & Tool Co. PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address
BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

The Drum Hose Cart.

Designed for Handling Yard Hose in Connection with Yard Hydrants.



Reel O takes 50 ft. 1-in. or 75 ft. 3/4-in. Hose. \$5.00 each
Reel A takes 100 ft. 1-in. or 150 ft. 3/4-in. Hose. \$6.00 each
Reel B takes 150 ft. 1-in. or 250 ft. 3/4-in. Hose. \$7.00 each
Write for discounts to the trade.
P. O. Box 214. MANARD & BRO., Rockford, Ill.

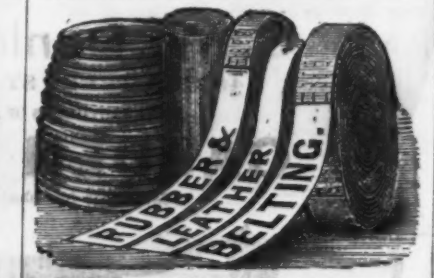
ESTABLISHED 1858.



The original and only Genuine Starwood Pumps, with or without Porcelain Cylinders. Tanning, Kave Trough and sole manufacturers of the Champion Improved Wind Mill. Sold by the trade generally. Send for catalogue and prices.

POWELL & DOUGLAS.

Waukegan, Ill.



PECK & BEMIS, Jobbers of Rubber Goods, manufacturers of Leather Belting and Leather Fire Hose. Sole agents for Hoyt's celebrated Oak Tanned Belting, also N. Y. Belting and Packing Co.'s goods. Ladies and Gents' Water-proof Garments. 179 Superior St., Cleveland, O.

THE Positive Lubricator

Patented April 22, 1879.
Feed according to speed of shaft.
No drip, no danger of fire.
Cheapest and cleanest.
Warranted not to gum.
W. J. FAUL,
Patentee & Sole Manufacturer,
218 Centre St.,
New York.
Send for circular.



HAWES' STEAM TRAP.

We guarantee this trap to work perfectly satisfactorily. Order one; if not satisfied, return at our expense. The monthly saving in fuel is more than cost of trap. Send for circular. Price from \$5 to \$15.
Welch & Lawson,
175 Centre St.,
New York.

E. S. LEE & CO.,

No. 4 West Ave.,
Rochester, N. Y., U. S. A.,
Sole Manufacturers of the



Mellert Foundry and Machine Co., Limited,
Manufacturers of
Cast-Iron
Water and Gas Pipe
of all sizes.
Valves and Hydrants, Flange Pipe and Lamp Fittings. Machinery for Grist, Saw and Rolling Mills. Also the celebrated CANADA WATER WHEEL, the cheapest and best in the world. Send for pamphlet.
READING, PA.



SEAMLESS COPPER PUMP.

(Pat. July 9th, 1876.)

In addition to the great variety of Iron and Brass Pumps which we have been manufacturing for years, we are now making a full line of COPPER PUMPS under a patent granted July 9, 1876. The Barrel and Cone are drawn in one piece. No flange or soldering is required. Being made of as heavy stock, they are stronger and more durable, give a perfect valve seat, and require less repairs than those made in the old manner. The Barrels are tested with a five hundred pound inside pressure to the square inch. The Spout also is seamless. Dealers and Plumbers pronounce them far superior to any before in the market. The inside of the Pump and the working parts are thoroughly tinned, giving a healthy surface for the contact with water. The handle is convenient and nickel-plated. The Pumps are highly finished, neatly painted and decorated with gold bronze, the whole being a highly serviceable and ornamental article for a kitchen of the most costly residence. Discount to the trade, 25 per cent. No charge for Box. Freight paid to Boston or New York. Orders for all varieties of Pumps filled promptly. Please send for price list.

UNION MFG. CO., New Britain, Ct.

Warehouse, 98 Chambers St., New York.

For sale in Boston by Walworth Mfg. Co. Hamblen & Matthews, Braintree, Mass.; Eaton & Dana, Macomber, Bigelow & Dowse, M. C. Warren & Co., and Bogman & Vinal; in Providence by Belcher Bros., and in Worcester by C. Foster & Co. and White & Conant.

Spofford's Patent Bit Brace.

Manufactured by
FRAY & PIGG,
Bridgeport, Connecticut, U. S. A.

All Iron, Four Sizes. Rosewood Head and Handle.
No. 7... 7-inch sweep. No. 107... 7-inch sweep.
No. 8... 8 " " No. 108... 8 " "
No. 10... 10 " " No. 110... 10 " "
No. 12... 12 " " No. 112... 12 " "
No. 14... 14 " " No. 114... 14 " "

SOMETHING NEW! PULLIAM'S PATENT BOLSTER SPRINGS FOR FARM WAGONS.



This valuable device is suited to wagons of any size—made of the best steel and warranted—by four bolts through the bed—can be put on by any person. They remain on the wagon for all uses and work equally well whether with empty or loaded wagon. There is no use for a spring seat—they make a comfortable spring wagon out of a farm wagon—and save largely in wear and tear. We want Agents everywhere. Send for description and prices, and mention this paper.
SEMPLE & BIRGE MFG. CO., St. Louis, Mo.
S. L. ALLEN & CO., Philadelphia, Pa., Agents.

FLANDER'S PATENT IMPROVED CRANK PIN MACHINE.

For turning off Crank Pins in position and while the wheels are under the engine. No railroad company should be without it. Manufactured and for sale in
L. B. FLANDERS MACHINE WORKS,
1025 Hamilton St., Philadelphia.
Descriptive circular on application.

of the partners. There was no proof that the firm received any consideration, or that one of the partners consented to the indorsement. Held, that it must be presumed that it was purely an accommodation indorsement, and that the creditor was not a bona fide holder, being privy to all the facts. A partner is not bound by an accommodation indorsement made in the name of the firm, but without his consent. One partner's declaration cannot bind his associates in matters foreign to the partnership, nor can his admissions bring such matters within the scope of the business.—*Heffron vs. Hunsford*, Supreme Court, Mich.

METALLURGICAL NOTES.

UNIFORMITY IN OPEN-HEARTH STEEL.

Some interesting observations were made some time since by Prof. Kerpely at steel works where the open-hearth process had been just introduced, and much trouble was experienced on account of the lack of uniformity of the metal, although the raw materials used were largely identical in quality. The following analyses of a number of rails made during four charges will sufficiently indicate the cause of the trouble:

No. of Charge.	No. of Rail.	Car.	Ph.	Sul.	Co.	Si.	Man.
I.....	1	0.398	0.193	0.077	0.009	0.005	0.145
II.....	2	0.373	0.189	0.077	0.010	0.010	0.145
III.....	3	0.398	0.193	0.077	0.009	0.005	0.145
IV.....	4	0.398	0.193	0.077	0.009	0.005	0.145
V.....	5	0.398	0.193	0.077	0.009	0.005	0.145
VI.....	6	0.398	0.193	0.077	0.009	0.005	0.145
VII.....	7	0.398	0.193	0.077	0.009	0.005	0.145
VIII.....	8	0.398	0.193	0.077	0.009	0.005	0.145
IX.....	9	0.398	0.193	0.077	0.009	0.005	0.145
X.....	10	0.398	0.193	0.077	0.009	0.005	0.145

A closer examination of these data will show that there is a strong variation in the chemical composition of old rails made from the same charge. Herr Kerpely attributes this entirely to the fact that the casting is done by running the metal directly into molds placed on a carriage, instead of allowing it to flow first into a casting ladle. The metal from different portions of the furnace, where it is exposed to oxidizing agencies varying in intensity, is not so thoroughly mixed as to become uniform. Notwithstanding the high percentage of phosphorus in these rails, the mechanical tests obtained from Nos. 2, 3, 6, 7 and 9 were comparatively favorable, and Herr Kerpely believes that this is due in a measure to the existence of some peculiar compound of phosphorus. He noticed that some of the samples, when treated with dilute nitric acid, left a residue which was dissolved only with difficulty. This phenomenon he found was limited to the poor samples of steel. He examined the residue and ascertained that it consisted of a pure compound of iron rich in phosphorus. Herr Kerpely has no explanation to offer of the circumstances conducive to the formation of the compound, which he believes to be a secondary product.

THE ACTION OF SPIEGELEISEN UPON THE PHOSPHORUS IN BESSEMER CINDER.

Mr. J. E. Stead, in a paper recently read before the Cleveland Institution of Engineers, advanced an hypothesis as to the cause of the reduction of the phosphoric acid in the cinder of the Bessemer process when spiegelisen is added, which differs entirely from the generally accepted theory that it is due to the reducing action of carbonic oxide evolved. He made several experiments to ascertain the effect of manganese upon phosphate of lime, and also upon phosphate of manganese. Into the bottom of a small basic-lined crucible were placed 1½ grams of phosphate of manganese, and upon the top of this 5 grams of ferromanganese, containing 71½ per cent. of manganese. In a second crucible a similar quantity of phosphate of lime was placed, and on the top of it the same quantity of ferromanganese, which was carefully covered over with more phosphate of lime. Into a third crucible phosphate of lime was put, and over it 5 grams of carburized iron, containing little or no phosphorus. All these crucibles were placed side by side in a larger plumbago crucible imbedded firmly in powdered basic bricks, and after the covers were securely placed, they were covered with about 1 inch more of powdered lime. The lid was now placed upon the plumbago crucible, which was introduced into a furnace and heated to whiteness for about an hour. It was then removed, and the fused metallic buttons taken out and subjected to analysis. The button from the crucible containing phosphate of manganese contained 67.6 per cent. of manganese, and an increase of 1 per cent. of phosphorus; that from the crucible containing phosphate of lime had increased a little over 1 per cent.; the manganese being respectively 67.6 and 68.6 per cent. The phosphorus in the decarbonized iron, which was treated in a similar manner to ferromanganese for comparison, had not increased above one-tenth of 1 per cent. In another experiment, in which the crucible was kept in the furnace for a greater length of time, it was shown that nearly 5 per cent. of phosphorus had been gained by the metallic button of ferromanganese when heated with phosphate of manganese. Judging, then, from these results, it appears that manganese not only very powerfully acts upon the phosphoric acid contained in phosphate of manganese, but it also has a great reducing effect upon the phosphoric acid contained in phosphate of lime. These results seem to prove that it is manganese which reduces the phosphoric acid from the cinder in the Bessemer converter.

THE EFFECT OF VIBRATORY SHOCKS UPON IRON.

The question whether iron, when exposed to shocks, vibrations or varying loads, changes in structure, becomes crystalline and thus loses in its resistance to stress, is by no means ultimately settled, and it may be of interest to cite some experiments made by Prof. Bauschinger, recently published in *Dingler's Poly. Journal*. With a view to ascertain whether the effects of long continued use are serious, he took three links from the chain bridge at Bamberg, Bavaria, which had been built in 1829. The dimensions of the links were: Total length, 8 feet 11.6 inches; thickness, 0.79 inches; diameter of eye, 2.44 inches, and width, 3.54 inches. These were compared with a link kept in reserve at the time when the bridge was built and never used (see A in following table), with a link made recently at the works at which those used in 1829 were manufactured, the processes being, as far as possible, identical (E in table). B in the table, an old link of 1829, was taken from the middle of the chain, C adjoined the first, while D was the third one from the end at which the chain was suspended. The following table gives the results of the mechanical tests made:

time put the transmitters into use and retained them, announcing their readiness to perform the contract. The Court took the papers and reserved its decision, after giving the defendant leave to file the record of the New York suit in this case.

Scotch Pig Iron.

NEW YORK, March 2, 1880.

To the Editor of The Iron Age.—DEAR SIR: In a recent issue you had a short article on this well-known product. You drew attention to the large quantity being thrown upon the American market, and in view of the slight knowledge many had of the metal they had purchased, you suggested that the Scotch iron trade should follow the example of the Westphalian ironmasters and publish a full and accurate account of the properties of their goods.

We think your suggestions "that the uses of Scotch pig iron are not as fully understood now as they were 10 or 20 years ago" (i. e., in America) exactly describes the present position, and, in the absence of the tests and data you desire, consumers cannot do better than refer to the record of tests by the late Herr Wachler, on which your remarks were based. Scotch pig iron was then put upon its trial, and as the motive which led to the establishment of that commission was a paternal desire to encourage native industry, it may safely be assumed that the Scotch pig was not unduly favored. It is, therefore, all the more striking to find it came out of the trial practically victorious, for while the utmost that was claimed was that "the trials gave collateral proof that so far as quality is concerned foundry pig iron is as well made in Germany as in Scotland," we find, on the other hand, the German Minister of Commerce writing to the commission thus: "Continuous testing must be kept up, since, according to our information, the chief fault found by consumers is that home-made foundry pig is perpetually varying in quality, while that of Scotch pig remains steady." And again, a few months later: "Granting that the German pig iron tested in course of the experiments has been proved equal to foreign, it should not be lost sight of that it is the steady uniformity in the quality of Scotch pig year after year which has secured for it so favorable a place in the estimation of the world."

So much for Scotch pig iron in general, and if a good brand be selected and it be kept in mind that the No. 1 quality imported here is intentionally charged with carbon to excess, in order that it may in admixture impart softness and fluidity and reduce the shrinkage of hard metal, whether pig or scrap, we are satisfied no complaint will be heard. It is seldom used alone, and should, for ordinary machinery castings, stand a mixture of 30 to 50 per cent. of good cast scrap.

As to the merits of the different brands, we shall not attempt to classify them; but, presuming that their respective qualities must be best known on the home market, we give below the prices current in the Glasgow market on the 31st of December last, when, as usual at the close of the year, very full statistics, extending over some years, were published, viz.:

Coltness.....	77/6	Summerlee.....	75/
Glenageoch.....	77/6	Gartshore.....	75/
Carnbroe.....	77/6	Edinburgh.....	75/
Langloan.....	75/	Govan.....	68/
Shotts.....	75/	Monkland.....	68/

The lowest priced article is seldom the cheapest in the end, and new consumers here will, we have no doubt, find that the only safe guide to the quality of the respective brands is the price they bring in the open market.

Yours truly,
"Scotch Pig."

The above letter is entirely in accordance with our understanding of the facts, but it scarcely answers the inquiries which reach us from consumers, looking to information as to what are the respective qualities of the different brands of Scotch iron, and for what uses or class of uses are those well known on this market especially adapted. To many large consumers Scotch iron is a comparatively new material. For years it has been but little used, and many of those who have bought it largely within the past few months know very little concerning it. If our correspondent, "Scotch Pig," can give us the general information which their inquiries call for, we shall take great pleasure in laying it before our readers.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The Old Colony Iron Works' shovel shop, at East Taunton, has been enlarged, and this department is employing an unusually large force. The wages of the employees of the establishment have been advanced twice since the first of the year.

Richard Dobbins, of Lowell, is running his works full time with between 30 and 40 hands, and has now in process of manufacture three sets of Corliss upright steam boilers for the Merrimack Mfg. Co., of Lowell, and one set of the same for the Boston Mfg. Co., of Waltham, besides several boilers of different kinds for other manufacturers. He is also engaged on a large belt box for the new 1000-horse-power engine now being built for the Lawrence Mfg. Co., of Lowell.

The Tremont Nail Company are to put into their iron works at Wareham a new 350-horse-power engine.

NEW JERSEY.

The Dover Rolling Mills, which have been idle for a number of years, have been purchased by the Dover Iron Company, of New Jersey. This company have been lately organized, with George Richards, president, and Charles A. Covert, secretary. The work of repairing and putting in order is being rapidly prosecuted, and hopes are entertained that the mills will be ready for work in about four weeks.

A rolling mill now building in connection with the nickel works at Camden will be finished by the 1st of March.

PENNSYLVANIA.

The Potts Furnace, which has been idle for a number of years, and which lies in the center of immense tracts of ore and timber, is being negotiated for by a party from

Bellefonte, and will likely soon be in blast again.

At Burnt Cabins and Fort Littleton, in Fulton County, large amounts of timber are being manufactured into charcoal. The Carrya mines, near the latter place, are to be reopened in a couple of weeks.

During the past year G. W. Hoffmaster has repaired the following furnaces: Monocacy Furnace, Nos. 1 and 3; Keystone, at Birdsboro'; the two East Penn furnaces, at Lyons; and No. 2 Keystone, at Reading. He is at present engaged in repairing and remodeling a furnace at Richmond Station, in the Cumberland Valley, and is building an additional mill furnace for the Maiden Creek Iron Company, at Blandon.

The two blast furnaces of the Stewart Iron Company, Limited, at Sharon, are working exclusively on Bessemer pig. Thirteen of the sixteen puddling furnaces in their mill are at work, the product being hammered into blooms for steel.

The sale of the Allen Furnace, at Sharpsville, which caused so much talk among iron workers, is not yet effected, nor is it likely that the property will go out of the hands of its present manager—this summer, at least.

The second blast furnace of the Howard Iron Works, Centre County, has been put in blast.

Western Furnace No. 2, at Sharon, blew in last week. This is a 14-foot furnace, and has lately received many improvements, among them being a new hot-blast oven of 48 pipes. The old brick abutments have been replaced by iron columns, and the whole concern has been greatly improved in appearance and utility.

The Mabel Furnace, at Sharpsville, is working off splendidly, making an even yield of No. 1 Bessemer. The new stack is under headway.

A large force of men have been engaged the entire winter in making charcoal in Bear Valley, Franklin County. The supply of charcoal for Franklin Furnace comes from this valley, and a contract has been made with the colliers, Messrs. Shoemaker & Shoop, for the daily delivery of 800 bushels to the new furnace of Messrs. Hunter & Springer, which is nearly completed at Chambersburg, and which will be put in blast in a few days.

Richmond Furnace, in Franklin County, which was recently chilled by reason of insufficient draft, has been remodeled by its lessees, Messrs. Rine & Bro., and will commence next week with increased capacity. Carrick Furnace, two miles above Richmond Furnace, has been leased by a Reading firm from the Shaler heirs, who have charge of it now, and after April 1 it will also be enlarged and run to its fullest extent.

The eyes of iron men of late have been turned toward Fulton County, and its mineral wealth has promise of a thorough development at an early day. The Messrs. Ahl Brothers own large tracts of mineral and timber land, and are arranging to erect furnaces thereon. Mr. J. J. Dull, of Harrisburg, is at present in the county, for the purpose of locating a site for a furnace.

The furnace of the Macungie Iron Company at Macungie has been put into operation. This furnace was formerly owned by the Millerstown Iron Co., which failed some time ago. The new company has been organized with the following board of directors: Messrs. J. T. Audenried, Wm. G. Audenried and Shaffer, of Philadelphia; James Singmaster, of Macungie; H. K. Hartzell and C. W. Cooper, of Allentown, and Richmond A. Jones, of Reading. The company have secured the services of Mr. W. N. Weaver, at one time superintendent of the Thomas Iron Company furnace at Lock Ridge. The Macungie Furnace produced, during the last year of its operations, 11,000 tons of pig iron, of which over 9000 tons were of No. 1 grade.

PITTSBURGH AND VICINITY.

The Westinghouse Air Brake Company have now found it necessary to establish a manufacturing and warehouse in London. They are situated in Canal Road, near the King's Cross Railway Station. The offices have also been transferred from Westminster to King's Cross.

Wm. Smith & Sons, Pittsburgh, are now manufacturing 36-inch pipe in fulfillment of a large contract with the city of Terre Haute, Indiana.

The National Tube Works at McKeesport are rolling, on a Lauth's universal mill, plates 42 inches wide by 60 feet long, without shearing.

The Pittsburgh Locomotive Works have under way a contract for five very large locomotives, the weight of each of which will be 50 tons. They are for use on the George's Creek and Cumberland Coal Railroad, the grade of which is 180 feet to the mile, and the service they are expected to perform on this steep grade requires them to be very heavy. The capacity of these works is two finished locomotives per week, and they have at present orders which will occupy the works for several months.

There is building in the boiler shops connected with the Pittsburgh Locomotive Works six new steel boilers for the Edgar Thomson furnaces at Bessemer. They are very large, being 65 feet in length, the heaters being 45 feet.

Every mill in Pittsburgh is now in operation in some one or other of its departments, the old Wood's mill being the last to start. This mill has been idle for some time, but started up its sheet department last week.

The boilers of the Clinton Mill, South Side, struck last week, owing to dissatisfaction with the quality of iron furnished them, but went back to work early this week.

The Crescent Tube Works are preparing to start double turn.

WEST VIRGINIA.

There is much disappointment among the people of Moundsville over the failure of the parties seeking a lease of the rolling mill there to make a satisfactory bargain. As a consequence, nothing has yet been done toward putting the mill in operation.

OHIO.

The Bessie Furnace, of Moss & Marshall, near New Straitsville, has been doing good work, averaging from 20 to 24 tons of good iron daily. The Gore, Wilson, and Baird furnaces are also doing well and making a

large quantity of good iron, which is being disposed of as soon as ready for market.

The charcoal furnace at Logan is rapidly being repaired, and will probably be put in blast about the 1st of March, under the management of Mr. Augustus Magoon. It has been idle for several years.

The Logan Manufacturing Company, under the supervision of Mr. John Strentz, have their large factory in full blast, turning out a large assortment of furniture, &c. They also have a large planing mill and get out all kinds of building material. They are running full time, employing about 30 hands, with large orders ahead.

The Hocking Valley Fire-Brick Works, at Logan, under the general supervision of Mr. W. Q. Adams, are running to their full capacity, with more orders booked than they can fill. This is comparatively a new work, and will be enlarged this spring. They make a fine quality of all shapes of fire-brick which are used in the Siemens-Martin furnaces. They are at present shipping largely to Chicago. About 35 men are steadily employed by the firm, and something over 4000 brick are manufactured daily.

At Shawnee the New York Furnace continues in full blast, turning out from 30 to 35 tons of fine iron daily. Both stacks of the Fanny Furnace are again in blast, doing well, under the management of their new superintendent, Mr. Josiah Palmer. The XX Furnace has been thoroughly overhauled by the new company, and will probably be blown in the first week in March.

Of the stonecoal furnaces in the Hanging Rock region, Star, Huron, Fulton, Tropic, Wellston and Milton will make iron. Orange will probably never blow again. Eliza may run. Milton, Fulton, Tropic and Huron are in blast now, the two first making 18 tons per day, and the two last 15 and 12 tons, respectively, whereas, but a few years ago, an average of 10 tons was considered good for any one of them. Star Furnace will blow in about April 1, and Wellston about the first of this month. Star has a new stack, and will be the largest furnace in this region, being 55 x 14. The Wellston, also remodeled, will be the next largest, 52 x 13½.

In the Jackson district, the charcoal interests are stirring. All the furnaces will run certainly, except Vinton, Cambria, Old Jackson and Hope, and there is a probability that the two first will make iron. Richland, Hamden, Eagle, Cornelia, Buckeye, Latrobe, Keystone, Madison, Gallia, Monroe and Scioto are now chopping wood. The year promises to be one of unusual activity.

Six new puddling furnaces are to be erected by Hall & Son, Hubbard, as soon as the addition to their mill is completed.

Cambria Furnace, in the southern part of Jackson County, will be rebuilt and put into blast. The old company, known as David Lewis & Co., will be reorganized as the Cambria Iron Company, and the furnace will be operated with charcoal for a few years and then turned into a stonecoal furnace. The furnace lands are rich with the same kind of coal now successfully used at Washington Furnace, a mile or two south of Cambria.

Grant Furnace is still running on coal and coke (in proportion of 2 pounds of the former to 1 pound of the latter) as fuel, and all native ore. The furnace is working well, and the quality of the metal is first-class. The present blast will continue about three weeks longer, at the expiration of which time the furnace will be blown out and put in good shape for a large blast on charcoal-car-wheel iron. The proprietors will blow in on charcoal about April 15.

Monitor Furnace blew out on the 27th ult., and Messrs. Whitman & Newcomb retire.

ILLINOIS.

The Belleville Nail Works are running full time, the demand upon them being now equal to their production.

The Big Muddy Iron Furnace, at Grand Tower, was sold recently by George W. Hill, Master in Chancery, for \$100,000, the Lewis Iron Company, of St. Louis, Mo., being the purchaser.

The Moline Plow Company employed last year about 500 hands, consumed 2500 tons of iron and steel, and 1,100,000 feet of lumber in the manufacture of plows.

MISSOURI.

During the year 1879 there was \$27,563 (foreign value) worth of pig iron imported direct to St. Louis. On this amount the duties paid were \$14,010.15.

KENTUCKY.

The Charlotte Furnace, owned by the Iron Hills Company and leased by the Charlotte Company, went into blast last week and is doing well.

MICHIGAN.

The old Hamtramck Furnace, Detroit, has been thoroughly renovated and equipped with all needed improvements by McMillan, Newberry & Co. The ownership is now known as the Detroit Iron Furnace Company, and the furnace would before this have been making iron but for some unavoidable delay in securing charcoal for fuel. However, it is expected it will be blown in during the coming week. It is understood that this furnace will make charcoal iron exclusively for the company's use in the manufacture of car-wheels and for the puddling department of the Baugh Steam Forge Company.

OREGON.

Iron manufacture is progressing on the Pacific Coast, but some of the furnaces have proved very unprofitable investments. The Oswego Iron Company, of Portland, mined last year 8000 tons of iron ore and had 7000 cords of firewood made into charcoal, and have now under contract, for delivery this year, 12,000 tons iron ore, and 12,000 cords of wood to be made into charcoal, as they expect to make 5000 tons of pig iron this year.

A Correction.—Our attention has been called to an error which might lead to the belief that the semi-magnetites of South-west Virginia might be used with much advantage for Herr Turner's proposed special "phosphorus pig" for the Thomas-Gilchrist process. In the analysis given on page 11, column 2, in the paper written by C. E. Boyd, we credit the magnetites of South-western Virginia with 5.028 per cent. of phosphorus, instead of 0.028 per cent.

Petroleum as a Fuel for the Blast Furnace.—Some very interesting experiments have recently been made at the Fannie Furnace of the Wheeler Iron Company, West Middlesex, Mercer County, Pa., the object of which was to test a device for utilizing petroleum as fuel in blast furnaces, the first experiment of the kind made. The crude petroleum is injected into the furnace in connection with hot blast and superheated steam. The chief obstacle in the way was the difficulty of injecting the fluid petroleum into the furnace against the pressure of the blast, but this difficulty has been overcome by a very ingenious arrangement, by which the pressure of the atmosphere is made to do service. The quantity of oil consumed is said to be small in proportion to the results produced, while the steam is heated by waste gas from the top of the furnace. The experiments have not thus far proved satisfactory in all details—a black cinder being produced, while the quantity of pig has fallen off. This is attributed to the fact that the arrangements for superheating the steam are insufficient. It is not in the item of cost that the chief advantage of the process is said to lie. The inventor claims that a large quantity of the sulphur, phosphorus and other impurities in the ore are eliminated in the furnace by the use of petroleum, and that as a superior quality of iron is secured, the gain in the quality will more than compensate for the increased cost of manufacture. It is thought also that the capacity of a furnace may be increased by using the process. Further experiments will be necessary in order to settle definitely what the invention will do, but the trial thus far is stated to have resulted in a run of metal of a superior quality.

Special Notices.

Foundry Property For Sale.

The property known as Jackson and Wiley's Foundry, Detroit, Mich., is offered for sale. The Real Estate and Machinery will be sold separately. Detailed lists of tools will be furnished on application. The foundry has a frontage on Woodbridge St., West, of 18 feet, running back to Congress St., 30 feet. The buildings run from Woodbridge St. to Congress St., 20 feet, with a frontage of 125 feet. The buildings are all in good order, and the machinery in first-rate condition. To parties desiring to locate a large manufacturing business in Detroit, this property offers unusual advantages; not only in the large area covered by the buildings and its ample yard room, but in its immediate proximity to the terminus of most of the Railroads centering in the city, and to the Detroit River.

Iron Gas Pipe

For Sale, at a Bargain.
2000 feet 3 1/2 inch, 30,000 feet 1/2 inch.
2000 feet 2 inch, 4000 feet 1/2 inch.
15,000 feet 1 1/2 inch.
Second hand, but good as new for any purpose; good threads and couplings.
Also, 100 Engines and Boilers, 8 to 20 horse, \$200 to \$500; 12-ton Locomotive and Tender, \$1000.
ROBERT LOGAN,
Oil City, Pa.

FOR SALE.

As a whole, or in parcels, 27,000 acres of Virginia agricultural and mineral lands, on James River, about 30 miles from Lynchburg. The ores are hematite and specular. There is one iron blast furnace on the property. Possession will be delivered to the purchaser without delay. Address the undersigned.

FRANCIS T. ANDERSON,
Court of Appeals, Richmond, Va.
(S. 10 to 15 and all the combinations.)
We find them correct and wonderfully "labor saving."—Sargent & Co., New York.
Counting House Edition (former price \$3), size 6x11 in., weight, 14 pounds, Cloth Bound, Large Type, \$2.00. Pocket Edition, size about 4x6 inches, Cloth Bound, Small Type, \$1.00.
Pocket Edition, Paper Covers, 75 cents.
Parties ordering the Pocket Edition will have the privilege of exchanging for Counting House Edition if they should desire it. Currency may be sent by mail at Publisher's risk. Address S. H. JENNINGS, Deep River, Conn.

For Sale.

Christiana Rolling Mill Property, situated on the south side of Christiansa Creek, Wilmington, Del. Main building, 92 x 130 feet, containing two trains of rolls 30 x 46 inches, and 26 x 72 inches. Complete in all its appointments for a first-class Plate Mill. Or, will sell an interest to a person having capital, experience and capable of conducting the business. Apply to
LOBDELL CAR WHEEL CO.,
Wilmington, Del.

FOR SALE.

Stock of General Hardware, Store Building and good Dwelling connected. Situated in a small town, and one of the best grain markets in Ohio. Good opening for an energetic man. For particulars address
Lock Box 186, Canton, Ohio.

For Sale.

The Stock and Fixtures of the Hardware business located at 49 Water and Commerce Sts., Norwich, Conn. Stock \$15,000 to \$20,000.
FULLER & PARISH,
Norwich, Jan. 26, 1880.

For Sale.

An interest in a well-established Machine Works and Hardware Manufacturing, doing a large and increasing business, well situated within 80 miles of New York, with direct communication by water or rail. Capital required, from \$5000 to \$10,000. For further particulars address, with reference, S. M. C.,
Office of The Iron Age, 83 Reade St., New York.

FOR SALE, CHEAP.

Second-Hand Engine, 12 x 28 Cylinder, 10 feet Fly Wheel, 1 foot Pulley, 16 inches face; can be run right or left hand of bed; Pump, Heater, &c., with engine. Also a horse-power Portable Engine and Boiler (Economizer, built by Porter Mfg. Co., Syracuse, N. Y.); nearly new and in perfect order. For particulars, call on or address
THE RENZ HARDWARE CO.,
Bridgeport, Conn.

WANTED—A competent man as Finisher in a Rolling Mill, near New York City, to make Merchant Iron. Address, stating salary expected and where last employed,
IRON,
P. O. Box 2333, New York.

Special Notices.

SECOND-HAND and NEW TOOLS FOR SALE LOW.

March List No. 1.

Miscellaneous Second-Hand Tools.
All in Good Order, and will be sold very low.
One Engine Lathe, 24 in. swing x 12 ft. bed.
One Engine Lathe, 28 in. swing x 14 ft. bed.
Seven Engine Lathes, 18 in. swing x 7 1/2 ft. bed. (Chain-feed Lathes).
One Horizontal Boring Lathe.
Two Wood-Turning Lathes.
One Cement Double-Pulley Lathe.
One Planer, 32 in. x 7 ft. chuck, &c.
One Planer, 72 in. x 66 in. x 24 ft.
Two Planers, 22 in. x 5 ft.
One Four-Spindle Drill.
Three Bolt Cutters, various sizes.
One No. 2 Bolt Cutter.
One new "Hardway" Bolt Heading Machine, to head up to 3/4-in. bolts.
One new "H-rdaway" Bolt Heading Machine, to head up to 1 1/2-in. bolts.
A lot of Wood Working Machinery.
One Engine Lathe, 24 in. swing x 10 ft. bed.
Two Profiling Machines, Two Spindle.
One Hydraulic Car Wheel Press.
One Large Punching Press.
Five Medium Punching Presses.
Six Small Punching Presses.
One N. Y. Steam Engine Co. Roll Cutter, 1/4 in. to 1 1/2 in.
One N. Y. Safety Steam Power Co. Upright, 15 H. P. Engine, and 80 H. P. Upright Boiler with all connections, &c.

NEW TOOLS, Very Low.

Five No. 2 Bolt Cutters, Wood & Light.
One No. 1 Bolt Cutter, with center, Wood & Light.
Three No. 2 Bolt Cutters, with center, Wood & Light.
One Engine Lathe, 26 in. swing, x 16 ft. bed.
One Planer, 30 in. x 4 ft.
One 26 in. swing Upright Drill, not back geared.
Two 26 in. swing back geared and self-feed Upright Drills.
Please specify which of the above tools you want and we will forward all particulars.

STEAM LAUNCH.

30 ft. x 7 ft.; draws 3 ft.; Engine, 5 1/2 x 9; Boilers, 12 x 4 1/2. Fitted with carpets, &c., for pleasure.

A Woodruff & Beach Beam Engine,

Low pressure, 48-inch cylinder, 84 inch stroke, with fly-wheel pulley 30 feet diameter, 36 inch face, and

Four Tubular Boilers,
60 inches in diameter, 20 feet long, and all connections practically as good as new.
For sale by

The Geo. Place Machinery Agency,
121 Chambers and 103 Reade Sts.,
NEW YORK.

Bargains in Tinware and Hardware.

Will offer the following low prices to the trade:

1/2 gal. Oil Cans.....	\$18.00	4 qt. Pails.....	\$24.00
1 gal. Oil Cans.....	24.00	Dinner Pails.....	27.00
Culenders.....	21.00	6 qt. Flaring Pails.....	18.00
1 pt. Cups.....	3.00	10 qt. Flaring Pails.....	30.00
1 qt. Cups.....	7.50	14 qt. Flaring Pails.....	36.00
2 qt. Cups.....	10.50	Bread Pans, small.....	12.00
3 qt. Cups.....	13.50	Bread Pans, large.....	14.00
1/2 pt. Funnels.....	4.50	Br'd Pans, shallow.....	10.00
1 pt. Funnels.....	7.50	4 piece Dish Pans.....	27.00
3 qt. Funnels.....	9.00	4 1/2 p. Dish Pans.....	30.00
1/2 sheet Graters.....	4.50	5 piece Dish Pans.....	36.00
1 sheet Graters.....	8.50	1 qt. Coffee Pots.....	12.00
1 qt. Pails.....	10.50	2 qt. Coffee Pots.....	18.00
3 qt. Pails.....	15.00	4 qt. Coffee Pots.....	27.00

STAMPED WARE.

STAMPED WARE.
6 qt. Milk Pans.....per gro. \$14.00
All other Stamped Ware.....per gro. \$12.00
Cuspadore, small.....per gro. \$21.00
Cuspadore, large.....per gro. \$24.00
An immense stock of all kinds of Shelf Hardware at less than market rates.
LATEST—Job lot Knox Fluters, just received, at \$13.00 per doz. for 6 inch, latest style.
This is the cheapest place in the U. S. to buy all kinds of Hardware.

A. W. WHEELER,
Dealer in Job Lots and Bankrupt Stocks,
141 Lake St., Chicago, Ill.
All sales spot cash.

A. J. STEINMAN, Chairman. W. B. MIDDLETON, Supt.
W. G. MENDENHALL, Sec'y & Treas.

OFFICE OF

PENN IRON COMPANY, Limited,

MANUFACTURERS OF
Merchant Bar Iron, Hammered and
Rolled Axles, Car Forgings, Bridge
Work, Fish Joints, Bolts, R. R.
Spikes, Bolt Ends, &c., &c.,
LANCASTER, PA.

FOR SALE.

One large Planer, 25 ft. long, 5 ft. square, built very heavy, in first class condition. Also, Shafting and Pulleys, and one large Cupola and one large Foundry Crane, all in good condition and for sale cheap. Address
PENN IRON CO., LIMITED,
Lancaster, Penn.

PRICE BOOKS.

Full Leather, \$7.50. Half Leather, \$6.50.
Pocket Edition, Full Leather, \$3.50.
Bolt List, \$1.50.
Leigh's Discount Book, 50 cents.
Buell Lamberson, 97 Chambers St., N. Y.
For sale at publisher's prices by Wm. Blair & Co., Chicago; A. F. Shippley & Co., St. Louis; C. B. James, Detroit.

AN EXPERIENCED HARDWARE
man, fifteen years in one large house in this city. Was bookkeeper, cashier, stock buyer, salesman and one of the managers. Open for any position at a moderate and reasonable salary. First-class city references. Address
HARDWARE, Station L, New York City.

Special Notices.

Reports and Information on all New Inventions and Processes.

Expert Scientific Counsel and testimony in law suits.

Machinery Selected and Tested.

Chemical Analyses and Assays.

Reports on Ice-Making Machines a specialty.

**PARK BENJAMIN'S SCIENTIFIC
EXPERT OFFICE,**
37 Park Row, - NEW YORK CITY.

BUSINESS FOR SALE.

Ohio Butt Co.'s Manufactory of Builders' and Cabinet Hardware.

We will sell our entire business, or we will sell the Machinery, &c., with or without the stock on hand.

The Machinery can be seen in operation at our shops.

Reasons for selling entirely of a personal nature, as the business has always been profitable.

Such an opportunity for investment of capital is rarely offered, as we can fully convince any one wishing to investigate.

OHIO BUTT CO.,

Joliet, Illinois.

MENGIS & CO., BANKERS

Railway Commission Merchants.

Dealers in all kinds of

Scrap, Wrought and Pig Iron,
Old Rails and Car Wheels.

NEW STEEL AND IRON RAILS A SPECIALTY.

We have established the above house for the purpose of doing a general Railway Commission business. We negotiate the sale of Railroads (or the controlling interests), and effect consolidations and reorganizations.

We also import direct from different European ports all grades of Iron, Pig, Bessemer Steel, Old Rails, &c.

We sell Locomotives, Passenger, Flat and Box Cars at manufacturers' prices.

Any business in our line we respectfully solicit a share of, always endeavoring to promote the interests of our customers. All orders, either by telegraph or mail, promptly attended to.

Mengis & Co.,
43 Pine St.,
NEW YORK.
Post Office Box 154.
Cable address, "MENGOIS, New York."

TO LEASE.

CHARCOAL FURNACE.

In the interior of the State. Timber for Coaling. Iron Ore, Limestone in immediate vicinity; farm and tenant houses. For particulars, address
P. O. BOX 253
Norristown, Montgomery Co., Pa.

HARDWARE.—Situation wanted as Clerk or Salesman in a Western Jobbing or Hardware retail house, by a young man having practical experience as buyer. Best references from present employer, New York City. Address M. A. H.,
Office of The Iron Age, 83 Reade St., N. Y.

A TRAVELER of 15 years' experience among the Wholesale Hardware trade West, representing a very popular line, would like to represent some special line or manufacturer on salary or commission. Address W. B. H.,
Office of The Iron Age, 83 Reade St., New York.

Sanderson Bros. Steel Co.
A limited number of shares for sale by
EDWARD FRITH & SON,
221 Pearl Street, New York.

WANTED.—By a young man, a situation in the Hardware or Iron business. Has had 14 years' experience as clerk and practical workman. Salary moderate; references given. Address
BOOK,
Office of The Iron Age, 83 Reade St., New York.

Special Notices.

SECOND-HAND

Machinists' Tools.

One 25 in. x 48 in. Corliss Engine.
One Engine Lathe, 90 in. x 20 ft. Ames, new.
One " " 60 in. x 20 ft. good as new.
One " " 37 in. x 24 ft. Pond, nearly new.
One " " 36 in. x 12 ft. Ames, new.
One " " 30 in. x 20 ft. good order.
One " " 30 in. x 16 ft. Wheeler, new.
One " " 26 in. x 14 ft. Wheeler, new.
One " " 26 in. x 13 ft. Heavy, fair order.
One " " 21 in. x 14 ft. Pond, nearly new.
One " " 20 in. x 6 ft. Wheeler, A. 1.
One " " 20 in. x 10 ft. Lincoln, new.
One " " 19 in. x 7 ft. Whitcomb.
One " " 16 in. x 8 ft. Wheeler, good order.
One " " 14 in. x 6 ft. Lathe & Morse.
One Chucking Lathe 28 in. x 8 in. x 3 ft. Lathe & Morse.
One Hand Lathe, 20 in. x 8 ft. Wheeler.
Two " " 20 in. x 10 ft.
Six " " 11 in. x 4 1/2 ft. Spencer, New.
Four " " 7 in. x 2 1/2 ft. " "
One Planer, 30 in. x 6 ft. Wheeler, A. 1.
One " " 27 in. x 6 ft. Miles, new.
One Shaper, 8 in. stroke. Gould.
One No. 2 Garvin Miller, new.
Two Lincoln Pattern Milling Machines.
One 24 in. Upright Drill, 8" geared and self feed, Ames.
Two 24 in. " " self feed, Ames, new. [new]
One 24 in. " " " Pratt & Whitney, A. 1.
One 10 in. " " Blaisdell.
One each P & W. No. 2, 2 sp. No. 1, 3 sp. No. 2, 4 spindle
Three Sensitive Drills, drills to 3-16 in. hole. [Drill]
One No. 4 Stiles Punch Press.
One No. 1, Wilder Punch Press, new.
One each No. 1 & 4, Wilder Punch Press, Geared, new.
One each No. 1 & 3, Wilder Bar Iron Cutter, new.
One Pratt & Whitney Profiling Machine.
One 10 H. P. Baxter Engine.
Six Stephens Vices.
Belting, Shafting and Miscellaneous Machinery.
E. P. BULLARD, 14 Dey St., New York.

For Sale.

The valuable Iron Ore property of the Wayne County Mining Company, situated in Wayne Co., N. Y., on the line of Lake Shore division of Rome, Watertown & Ogdensburg R. R., with tracks and branches leading to the mines. This property extends over four miles along said road, and nowhere over half a mile from it, and contains over two millions of tons. It is now in full operation and shipping from 100 to 200 tons per day, and is capable of doubling that amount. It is only 17 miles from Port of Genesee, one of the best harbors on Lake Ontario, with ample dock room for shipping by lake. For further particulars, address
J. E. ELLIOTT, Sec'y,
Clinton, Oneida Co., N. Y.

Bissell & Welles,
Wholesale Hardware Auctioneers,
83 Chambers and 65 Reade Sts., N. Y.
Sales held weekly for the trade. Consignments solicited. We refer to the leading Manufacturers and Importers.

For Sale.

23 in. x 48 in. CORLISS ENGINE.
Can be seen running. Will be delivered latter part of this month. Also 18 in. x 48 in. Hewes & Phillips. Can be delivered at once.
E. P. BULLARD,
14 Dey St., New York.

JOHN R. WHITLEY & CO.,
European Representatives of First-Class American Houses,

WITH
FIRST-CLASS AGENTS

IN THE
Principal Industrial and Agricultural Cities and Centers of Europe.

TERMS ON APPLICATION.
LONDON, PARIS,
7 Poultry, E. C. 8 Place Vendome.

DISCOUNT BOOK,

For Hardware Buyers, shows at a glance the net of any discount or combination. Also contains Computing Tables for quickly and accurately reckoning discounts without multiplication. Price, in leather, \$1.00. In Cloth, 50 cents.
Address
E. B. LEIGH,
St. Louis Elevator, St. Louis, Mo.
IVISON, BLAKEMAN, TAYLOR & CO., New York.

A Bargain.

I offer for sale at a bargain, my house, store-house, workshop, and complete stock of general Hardware. Fine opportunity for a live man. Country fine and developing rapidly.
J. S. WHEELER,
Laverne, Minn.

**STEAM ENGINE, 16 x 32,
FOR SALE.**
In good order, and now in operation running all the machinery in the Fort Plain Spring and Axle Works, can be seen at any time. Sold to make room for a 20 x 42, to be put in April 1.
WOOD, SMITH & CO.,
Fort Plain, N. Y.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas. Address
HARDWARE,
Box 366, Salina, Kansas.

FOR SALE.

Stock of Shelf and Heavy Hardware, Stoves, &c., in Canastota, Madison Co., N. Y. The only hardware store in the place, and doing good business. Worth from \$7000 to \$8000. Will be sold low and on easy terms. Reasons for selling, poor health. Address
H. C. JARVIS,
Canastota, N. Y.

Practical Furnace Manager and Superintendent wishes a situation to run one or more furnaces. Best of references as to character and ability. Address
M. C.,
P. O. Box 3612, New York City.

Special Notices.

Pipe Mill for Sale or Rent.

The above property is situated at Middletown, Dauphin Co., Pa., nine miles east of Harrisburg, on the Pennsylvania Railroad, with which it is connected by a siding. The building is brick, with a slate roof; size of main building, 108 by 35 feet; engine house, 30 by 36 feet, and a 75-foot stack. A frame pipe shed runs the whole length of building. There are two welding furnaces and one scarp furnace, with room for as many more; a sixty-horse-power engine; eight-horse-power tubular boiler, and all machinery necessary to run a pipe mill. Machine shop and machinery are on the second story of engine house. Engine, boiler and all machinery are in first class condition, and the entire works are in good repair and could be started at a very small expense. There is also a frame office 12 1/2 by 16 feet about fifty feet from mill, with large Farn-I & Herring safe, letter press and office furniture. This property will be sold at a low price, and on the most advantageous terms to purchaser, or will be rented very reasonably. For further particulars apply to
JAMES YOUNG,
Middletown, Dauphin Co., Pa.

E. S. Wheeler & Co.,

54 CLIFF ST.,

NEW YORK,

OFFER

SPECIAL INDUCEMENTS

IN

QUALITY AND PRICE

IN

English

and

Scotch

Foundry

PIG IRON.

FOR SALE.

Planers; Engine Lathes; Turret Lathes; Crank Planer; Boring Lathe and Bar; Car Wheel Borer; large Slotter; 7 ft. x 26 ft. Lathe; 3 Milling Machines; Crank Planer; Suspended Drill; 2-ton Chain Blocks; 2 Steam Pumps; Pumps; Siphons; Injectors; 6 to 7 Valves, 4 to 8-inch; Wood-Working Machinery; Horizontal Engine, 6 to 10, 7 1/2, 8, 12, 10 x 12, 10 x 20, 12 x 21, 24 x 28, 12 x 12; Boilers, all sizes; large Blowers; large Mackintosh ver. Write for description.
A. G. BROOKS & WINSTON,
261 N. Third Street, Philadelphia.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,
Issue Licenses to use the Process for the

Manufacture of Iron and Steel
In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.
The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working.
See page 17 of The Iron Age of Oct. 25th, 1877.

TRUSTEES' SALE OF VALUABLE IRON PROPERTY.—TWO NEW CHARCOAL BLAST FURNACES, FORTY-FOUR THOUSAND ACRES OF VALUABLE LAND—FURNISHING a mortgage executed by James Woods, H. C. Yeatman and James Woods, Jr., registered in the Register's Office of Stewart Co., Tennessee, in book 24, pages 49 to 50, inclusive, the undersigned will sell on the premises, for cash, on the 31st day of March, 1880, that very valuable iron property located in Stewart County, Tennessee, known as Cumberland Iron Works. Parties wishing fuller information will please address the undersigned, care of Third National Bank, Nashville, Tenn.
TEMPLE O. HARRIS, Trustees.
V. L. KIRKMAN, Trustees.

ASTONISHING POWER IN PUNCHING & SHEARING PRESSES.

See our illustrated advertisement on next to last page of this paper.
PEERLESS PUNCH AND SHEAR CO.,
52 Dey Street, New York City.

FOR SALE.

Job Lots and Bankrupt Stocks Hardware.
Great bargains offered to the trade.
A. W. WHEELER,
141 Lake St., Chicago.

For Sale---Window Glass Works.

Situated near a large Western city, in the midst of good coal, with rock, sand and wood close by and cheap. Works has 6-spot Furnace; 2 Blowing Furnaces; 4 holes each, and 4-stone Flattening Oven, with all needed buildings and appliances. Will be sold cheap. Address
JOS. D. WEEKS,
Office of The Iron Age, 77 4th Ave., Pittsburgh, Pa.

Saw Mill Property for Sale.

Two acres and one-third of land; good, heavy frame-two-story buildings; brick engine room; 8-horse-power patent cut-off engine, built by Cooper, Mt. Vernon; two five-horse Boilers, and large double circular Saw Mill. All first-class machinery, been run about two years. Situated in Monroe, Mich.; good water privilege for logs, and railroad in yard. Cost \$15,000, for sale for \$5000, all complete as it stands. For further particulars, address
W. W. COOKE, 366 Summit St., Toledo, O.

WANTED.—A situation as Shingler, Slabbing or blooming. Have had 18 years' experience. Address
HENRY CROKER,
83 Rebecca St., Allegheny City, Pa.

Porcelain Door Knobs, Porcelain Mountings.

870, 2 1/2 M.	9.80	875 1/2, 2 1/2 R.	7.90
875, 2 1/2 M.	9.80	880, 2 1/2 M.	12.90
875 1/2, 2 1/2 M.	7.20	885, 2 1/2 M.	12.90
875 1/2, 2 1/2 R.	7.20	885 1/2, 2 1/2 M.	18.90
875 1/2, 2 1/2 M.	7.20	885 1/2, 2 1/2 R.	18.90

Jet Door Knobs, Amber Bronzed Mountings.

3700, 2 1/2 M.	4.32	3700 1/2, 2 1/2 R.	4.32
----------------	------	--------------------	------

Jet Door Knobs, Bronze Plated Mountings.

4800, 2 1/2 M.	5.20	4800 1/2, 2 1/2 R.	5.20
----------------	------	--------------------	------

Jet Door Knobs, Nickel-Plated Mountings.

3800, 2 1/2 M.	7.00	3800 1/2, 2 1/2 R.	7.00
----------------	------	--------------------	------

Jet Door Knobs, Bronze Metal Mountings.

3800, 2 1/2 M.	8.80	3800 1/2, 2 1/2 R.	12.60
----------------	------	--------------------	-------

Brass Door Knobs.

940, 2 1/2 M.	26.84	951, 2 1/2 R.	30.45
---------------	-------	---------------	-------

Silver-Plated Door Knobs.

954, 2 1/2 M.	60.00	957, 2 1/2 R.	68.00
---------------	-------	---------------	-------

Nickel-Plated Door Knobs.

954 1/2, 2 1/2 M.	48.00	957 1/2, 2 1/2 R.	57.60
-------------------	-------	-------------------	-------

Hand Plated Door Knobs.

960, 2 1/2 M.	86.40	963, 2 1/2 R.	95.00
---------------	-------	---------------	-------

Silvered Glass Door Knobs.

940, 2 1/2 M.	26.65	941 1/2, 2 1/2 R.	26.65
---------------	-------	-------------------	-------

Amber Bronzed Door Knobs.

3320, 2 1/2 M.	8.64	3319 1/2, 2 1/2 R.	9.44
----------------	------	--------------------	------

Refrigerator Door Knobs.

992, 1 1/2 M.	1.90	994, 1 1/2 R.	2.20
---------------	------	---------------	------

Turnbuckle Knobs.

915, 1 1/2 M.	3.20	917, 1 1/2 R.	3.40
---------------	------	---------------	------

Oblique T Handles and Knobs.

918, 1 1/2 M.	3.20	919, 1 1/2 R.	3.40
---------------	------	---------------	------

Straight T Handles.

920, 1 1/2 M.	3.20	921, 1 1/2 R.	3.40
---------------	------	---------------	------

Crank Handles and Knobs.

922, 1 1/2 M.	3.20	923, 1 1/2 R.	3.40
---------------	------	---------------	------

Mortise Bolt Knobs.

924, 1 1/2 M.	1.68	925, 1 1/2 R.	1.84
---------------	------	---------------	------

Bell Pulls.

1000, 1 1/2 M.	3.40	1001, 1 1/2 R.	3.60
----------------	------	----------------	------

METAL PLATE ESCUTCHEONS.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Electro or Nickel-Plated, With Screws.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Hand Plated, With Screws.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Bronzed Iron.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Prussian Bronzed furnished to order.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

METAL DROP ESCUTCHEONS.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Electro or Nickel-Plated, With Screws.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Hand Plated, With Screws.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Bronzed Iron.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Prussian Bronzed furnished to order.

Nos. Per single doz.	Nos. Per single doz.
----------------------	----------------------

Porcelain Escutcheons.

No. Per doz.	No. Per doz.
--------------	--------------

Drop.

No. Per doz.	No. Per doz.
--------------	--------------

McCauffrey & Brother, proprietors of the Pennsylvania File Works, Philadelphia, have issued, under date of 1st instant, a revised price list for Files and Rasps, which we print below. The following circular accompanies it:

Office of PENNSYLVANIA FILE WORKS,
FOURTH STREET AND COLUMBIA AVENUE,
PHILADELPHIA, March 1, 1880.

GENTLEMEN: Inclosed you have one of our new price lists, which we have adopted this day. In comparing it with our old, or English list, as well as with our competitors, we hope you will find it satisfactory. It is lower on some Files and higher on others, in fact it is the result of months of labor in trying to equalize the price, so that each and every File and Rasp will pay about the same margin of profit. On an assorted order you will find little or no difference, it

being more uniform, easier understood, and we believe it will give more satisfaction to the trade. The discount remains the same. Yours respectfully,
McCauffrey & Bro.

McCauffrey's Philadelphia List.

Files, Square and Mill (Best), Per dozen.

Files, Square and Mill (Second), Per dozen.

Files, Square and Mill (Third), Per dozen.

Files, Square and Mill (Fourth), Per dozen.

Files, Square and Mill (Fifth), Per dozen.

Files, Square and Mill (Sixth), Per dozen.

Files, Square and Mill (Seventh), Per dozen.

Files, Square and Mill (Eighth), Per dozen.

Files, Square and Mill (Ninth), Per dozen.

Files, Square and Mill (Tenth), Per dozen.

Files, Square and Mill (Eleventh), Per dozen.

Files, Square and Mill (Twelfth), Per dozen.

Files, Square and Mill (Thirteenth), Per dozen.

Files, Square and Mill (Fourteenth), Per dozen.

Files, Square and Mill (Fifteenth), Per dozen.

Files, Square and Mill (Sixteenth), Per dozen.

Files, Square and Mill (Seventeenth), Per dozen.

Files, Square and Mill (Eighteenth), Per dozen.

Files, Square and Mill (Nineteenth), Per dozen.

Files, Square and Mill (Twentieth), Per dozen.

Files, Square and Mill (Twenty-first), Per dozen.

Files, Square and Mill (Twenty-second), Per dozen.

Files, Square and Mill (Twenty-third), Per dozen.

Files, Square and Mill (Twenty-fourth), Per dozen.

Files, Square and Mill (Twenty-fifth), Per dozen.

Files, Square and Mill (Twenty-sixth), Per dozen.

Files, Square and Mill (Twenty-seventh), Per dozen.

Files, Square and Mill (Twenty-eighth), Per dozen.

Files, Square and Mill (Twenty-ninth), Per dozen.

Files, Square and Mill (Thirtieth), Per dozen.

Files, Square and Mill (Thirty-first), Per dozen.

Files, Square and Mill (Thirty-second), Per dozen.

Files, Square and Mill (Thirty-third), Per dozen.

Files, Square and Mill (Thirty-fourth), Per dozen.

Files, Square and Mill (Thirty-fifth), Per dozen.

Files, Square and Mill (Thirty-sixth), Per dozen.

Files, Square and Mill (Thirty-seventh), Per dozen.

Files, Square and Mill (Thirty-eighth), Per dozen.

Files, Square and Mill (Thirty-ninth), Per dozen.

Files, Square and Mill (Fortieth), Per dozen.

Files, Square and Mill (Forty-first), Per dozen.

Files, Square and Mill (Forty-second), Per dozen.

Files, Square and Mill (Forty-third), Per dozen.

Files, Square and Mill (Forty-fourth), Per dozen.

Files, Square and Mill (Forty-fifth), Per dozen.

Files, Square and Mill (Forty-sixth), Per dozen.

Files, Square and Mill (Forty-seventh), Per dozen.

Files, Square and Mill (Forty-eighth), Per dozen.

Files, Square and Mill (Forty-ninth), Per dozen.

Files, Square and Mill (Fiftieth), Per dozen.

Files, Square and Mill (Fifty-first), Per dozen.

Files, Square and Mill (Fifty-second), Per dozen.

Files, Square and Mill (Fifty-third), Per dozen.

Files, Square and Mill (Fifty-fourth), Per dozen.

Files, Square and Mill (Fifty-fifth), Per dozen.

Files, Square and Mill (Fifty-sixth), Per dozen.

Files, Square and Mill (Fifty-seventh), Per dozen.

Files, Square and Mill (Fifty-eighth), Per dozen.

Files, Square and Mill (Fifty-ninth), Per dozen.

Files, Square and Mill (Sixtieth), Per dozen.

Files, Square and Mill (Sixty-first), Per dozen.

Files, Square and Mill (Sixty-second), Per dozen.

Files, Square and Mill (Sixty-third), Per dozen.

Files, Square and Mill (Sixty-fourth), Per dozen.

Files, Square and Mill (Sixty-fifth), Per dozen.

Files, Square and Mill (Sixty-sixth), Per dozen.

Files, Square and Mill (Sixty-seventh), Per dozen.

Files, Square and Mill (Sixty-eighth), Per dozen.

Files, Square and Mill (Sixty-ninth), Per dozen.

Files, Square and Mill (Seventieth), Per dozen.

Files, Square and Mill (Seventy-first), Per dozen.

Files, Square and Mill (Seventy-second), Per dozen.

Files, Square and Mill (Seventy-third), Per dozen.

Files, Square and Mill (Seventy-fourth), Per dozen.

Files, Square and Mill (Seventy-fifth), Per dozen.

Files, Square and Mill (Seventy-sixth), Per dozen.

Files, Square and Mill (Seventy-seventh), Per dozen.

Files, Square and Mill (Seventy-eighth), Per dozen.

Files, Square and Mill (Seventy-ninth), Per dozen.

Files, Square and Mill (Eightieth), Per dozen.

Files, Square and Mill (Eighty-first), Per dozen.

Files, Square and Mill (Eighty-second), Per dozen.

Files, Square and Mill (Eighty-third), Per dozen.

Files, Square and Mill (Eighty-fourth), Per dozen.

Files, Square and Mill (Eighty-fifth), Per dozen.

Files, Square and Mill (Eighty-sixth), Per dozen.

Files, Square and Mill (Eighty-seventh), Per dozen.

Files, Square and Mill (Eighty-eighth), Per dozen.

Files, Square and Mill (Eighty-ninth), Per dozen.

Files, Square and Mill (Ninetieth), Per dozen.

Files, Square and Mill (Ninety-first), Per dozen.

Files, Square and Mill (Ninety-second), Per dozen.

Files, Square and Mill (Ninety-third), Per dozen.

Files, Square and Mill (Ninety-fourth), Per dozen.

Files, Square and Mill (Ninety-fifth), Per dozen.

Grindstone Hangings.

Barn Door Hangers.	25.10
--------------------	-------

Hay Fork Pulleys and Rafter Hooks.

Well Wheels.	40.10
--------------	-------

Boot Jacks.

Nut Cracks.	30.10
-------------	-------

Saw Vises.

Toy Safes.	25.10
------------	-------

Apple Parers.

Apple Parers.	20.10
---------------	-------

The Manufacturers of Silver Plated Ware.

advanced the price of Silver Plated Flat Ware and Hollow Ware to discount 33 1/2 per cent., on the 19th ultimo.

Henry Disston & Sons have given out contracts for a new Sheet mill, to be erected on their property at Tacony, near Philadelphia. The new mill will have 24 Steel melting holes. Their mill in Philadelphia is running to its utmost capacity day and night, three relays of workmen being employed.

W. K. Ross and J. A. Fuller, No. 95 Chambers street, representing W. P. Kellogg, Troy, N. Y., illustrate, in their advertisement on the 11th page, a Swivel Back Grasp Curry Comb, to which we invite attention.

BRITISH IRON MARKET.

[Special Report by Cable to The Iron Age.]

LONDON, Wednesday, March 3, 1880.

Scotch Pig.—The market is very unsettled, and makers' prices are difficult to quote.

Since last Wednesday prices have declined, and in the present state of the market quotations can only be given approximately. The figures we give show a decline of 3/6 on Glengarnock, 3/0 on Eglinton, and 2/6 on both Gartsherrie and Coltness. The following prices are as near as we can give:

Gartsherrie.	77/6
--------------	------

Coltness.	77/6
-----------	------

Glengarnock.	77/6
--------------	------

Eglinton.	77/6
-----------	------

Manufactured Iron.—There is no change to note in the condition of the market, which is very quiet. Best Staffordshire Bars are quoted unchanged at £9.

Steel Rails.—Are quiet, with little doing.

We quote, nominally, £9. 5/ @ £10, a reduction in the range of 10/ to £1.

Iron Rails.—The demand continues to decline, and there is very little doing. We quote Welsh, nominally, £8. 10/ @ £9. 15/.

Old Rails.—Large quantities are offered in the market, but few are taken. Prices are very weak. We quote, £6. 10/ @ £7, a falling off of 5/ from last week's figures.

Wrought Scrap.—There is nothing doing. Prices remain, nominally, £6. 5/.

IRON.

American Pig.—There is very little inquiry for Pig Iron and the market continues weak, and by contrast with the recent activity, it seems even more depressed than it would probably appear under normal conditions at this season of the year. American Pig is very firmly held, when we consider the large quantity of foreign iron that is forced upon the market. We hear of a sale of 400 tons (a special brand of Anthracite) at £42, which is looked upon as being altogether exceptional. We continue to quote £40 as the basis for No. 1 Foundry Iron, although we hear of one or two brands being offered at a concession of \$1 per ton from this figure. Forge Iron seems to be even more depressed than the other numbers, and quotations could be shaded, it is thought, for prompt cash. We quote Foundry No. 1, \$40; No. 2 X, \$38; Gray Forge, \$36.

Scotch Pig.—The arrivals of foreign Pig Iron at this port for the week ending 2d instant aggregate 10,280 tons, fully 3000 tons of which has gone into store. There is also afloat a considerable quantity of iron, and it is expected that the arrivals for some time will be heavy; all of which, at a time so inopportune as the present, when inactivity seems for the moment to possess the market, tends to still further depress prices, although we cannot report any quotable yielding from the figures of last week. The only sales we hear of are 200 tons Gartsherrie, 150 tons Coltness and 150 tons Glengarnock, all on private terms. We quote: Eglinton, \$31; Coltness, \$34 @ \$35; Glengarnock, \$31; and Gartsherrie, \$32.

Rails.—We are informed that during the past two weeks not less than 20,000 tons of foreign Steel Rails have been contracted for, at prices ranging from \$79 @ \$81 here. Several parcels of foreign Iron Rails have also been ordered, but the exact amount we did not learn; the prices named were equivalent to \$63 for heavy and \$65 @ \$66 for light sections, delivered at this port. We do not hear of any business in American Rails, either Steel or Iron.

Old Rails.—Sales are reported of 10,000 tons D. H. to arrive, on private terms. The market as regards spot lots is exceedingly dull, and no transactions are reported since we last went to press. We quote \$42 @ \$43 for T and D. H. respectively.

Scrap.—Prime No. 1 Wrought is still quoted at \$45 from yard, but we hear of no business and but little inquiry.

Manufactured Iron.—The arrivals of finished iron from abroad were heavy during the week ending March 2, the number of Bars being estimated at nearly 33,000 to this port alone. The amount of foreign iron in the market at present is larger than it has been in many years, and its presence tends to weaken the price of domestic iron. The card rate for Refined Bar is still quoted \$45, but 3.8¢ more nearly represents the actual figure at which sales are being made.

METALS.

Copper.—A very quiet state of affairs has prevailed during the week under review, sales being limited to 100,000 pounds Lake Superior at 24c., which is also the nominal quotation for Baltimore. In futures nothing has transpired. No change is reported per cable from London, where Best Selected was still quoted £32, and Chili Bars £72

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending March 2, 1880:

Copenhagen.		Havt.	
Quan. Val.		Quan. Val.	
Ag. imp. pags. 76	\$3,159	Hdw., cs.	62 \$1,435
Pumps, pags. 6	591	Mf. iron, pags. 59	862
St'pware, cs. 24	500	Cutlery, cs.	23 416
Hdw., pags. 100	886	Glassware, cs. 40	1,250
Christiansand.			
Ptlin., gals. 133,633	10,699	Ptlin., gals.	300 345
Elstinoe.			
Ptlin., gals. 125,900	10,072	Nails, kegs.	97 324
Tedestrand.			
Ptlin., gals. 113,076	10,000	Mach'y, pags. 6	1,687
Hamburg.			
Bells, cs.	4 418	Guns, cs.	40 3,400
Hdw., pags. 102	3,168	Sew. mach., cs. 3	78
Ag. imp. pags. 66	4,148	Brasili.	
Wringers, cs. 7	353	Mf. iron, pags. 10	285
Mach'y, pags. 28	3,230	Emdware, cs. 1	130
Gas fits, cs. 8	150	Cutlery, cs.	80 2,395
Lub. oil, bbls. 100	2,000	Mach'y, cs.	47 777
Cop. mts. bbls. 100	2,000	Glassware, cs. 135	838
Tinware, cs. 24	1,084	Pumps, pags. 5	479
Bremen.			
Ptlin., gals. 69,683	50,916	Carriages,	1 80
Hdw., pags. 39	850	Wire, csks.	2 240
Cars,	1 3,800	Sew. mach., cs. 50	830
G'dstones, bxs. 100	200	Nails, kegs.	130 685
Ag. imp. pags. 17	677	Shoe nails, cs. 12	220
Mf. iron, pags. 10	414	Trucks,	12 72
Sew. mach., cs. 5	130	Tinware, cs.	8 284
Ptld. ware, cs. 1	100	Iron, cs.	400 2,300
British West Indies.			
Ptlin., gals. 22,680	2,640	Ag. imp. pags. 12	220
Tinware, pags. 10	241	Revolvers, cs. 2	202
Glassware, pags. 20	241	Central America.	
Nails, kegs.	63 283	Ptlin., gals.	260 31
Mf. iron, pags. 4	173	Cutlery, cs.	10 354
Ag. imp. pags. 11	141	Hdw., cs.	7 130
Lead pipe, pgs. 20	45	Tinware, cs.	6 145
Cutlery, cs.	1 50	Guns, cs.	3 247
Sew. mach., cs. 5	120	Shot, mchks.	17 110
Hdw., pags. 53	907	Notions, cs.	4 304
Burners, cs.	1 100	Porto Rico.	
Lead, rolls,	3 132	Ptlin., gals.	500 540
British East Indies.			
Ptlin., gals. 600,000	68,750	Hdw., cs.	6 65
British Guiana.			
Ptlin., gals. 10,000	1,062	Sew. mach., cs. 3	98
Carriages,	2 400	Morocco.	
Ptldware, cs.	2 258	Ptlin., gals.	2000 230
British Possessions in Africa.			
Ag. imp. pags. 268	9,327	Liverpool.	
Ptlin., gals. 15,000	9,973	Lub. oil, bbls. 500	4,795
Hdw., pags. 67	994	Ptlin., gals.	380,599 24,428
Haere.			
Ptlin., gals. 419,450	38,313	Mach'y, cs.	34 2,890
Bordeaux.			
Ptlin., gals. 99,066	90,655	Belting, cs.	3 900
French West Indies.			
Ptlin., gals.	240	Hdw., cs.	147 8,722
Seville.			
Ptlin., gals. 51,500	5,600	Metals, pags. 15	1,460
Belfast.			
Lub. oil, bbls. 443	3,722	Ptldware, cs.	1 150
Canada.			
Glassware, cs.	5 25	Sew. mach., cs. 280	3,068
British North American Colonies.			
Pig iron, tons. 30	2,000	Telephones, cs. 12	1,250
Glass, bbls.	2 400	Ag. imp. pags. 8	608
Ptlin., gals.	130	Glassware, cs.	2 800
Palma de Mallorca.			
Ptlin., gals.	390	Mf. iron, pags. 4	360
Bilbao.			
Ptlin., gals. 153,401	12,464	Nickel mat., cs. 32	3,420
Valencia.			
Ptlin., gals. 86,618	9,908	London.	
Glasgow.			
Belting, cs.	5 1,617	Lead trps, pgs. 16	758
Ag. imp. pags. 10	150	Tel. mts., pgs. 7	1,500
Mach'y, cs.	57 300	Hdw., cs.	258 5,433
Mach'y, cs.	11 485	Tin plate, cs. 7	300
Hdw., pags. 518	2,409	Rules, cs.	2 364
Ptldware, cs.	2 435	Sew. mach., cs. 62	1,230
Cuba.			
Hdw., cs.	202 2,927	Ag. imp. pags. 204	7,436
Mf. iron, pags. 98	1,005	Mach'y, cs.	30 1,235
Coal, tons.	959 2,028	Glassware, cs.	3 35
Iron, pags.	2 1,028	Hull.	
Nails, kegs.	140 833	Iron rolls, bxs. 3	300
Mach'y, cs.	61 2,306	Rifles, cs.	100 25,400
Boiler tubes, 353	645	Ag. imp. pags. 657	29,834
Glassware, cs.	247 1,028	Mf. iron, pags. 2	59
Ptlin., gals. 235,000	21,802	Ptldware, cs.	1 50
Hp. iron, bbls. 180	474	Sew. mach., cs. 127	1,637
Sew. mach., cs. 26	454	Ag. imp. pags. 225	8,846
Hoop,	108,420 3,508	Cisleptine Republic.	
Ag. imp. pags. 15	191	Wringers, cs.	5 128
Oporto.			
Ptlin., gals. 67,753	5,600	Cutlery, cs.	83 591
Philippine Islands.			
Ptlin., gals.	23,800	Ptldware, cs.	1 256
Old Metals, Paper Stock, &c.			
The Old Metal market is dull this week and prices are not very firm; iron especially is weak. We have no important change to note in Rags and Paper Stock.			
The purchasing prices offered by dealers for Old Metals are as follows:			
Copper, heavy,	per lb. \$0.21	3	...
Copper Bottoms,	per lb. \$0.16	17 1/2	...
Yellow Metal,	per lb. \$0.10	11	...
Brass, heavy,	per lb. \$0.12	11	...
Brass, light,	per lb. \$0.10	11	...
Composition, heavy,	per lb. \$0.15	10	...
Lead, heavy,	per lb. \$0.04 1/2	10 1/2	...
Lead, light,	per lb. \$0.04 1/2	10 1/2	...
Zinc,	per lb. \$0.05 1/2	10 1/2	...
Pewter, No. 1,	per lb. \$0.07	10 1/2	...
Pewter, No. 2,	per lb. \$0.07	10 1/2	...
Wrought Iron,	per ton \$35.00	37.50	...
Light do,	per ton \$25.00	25.00	...
Score Plate,	per ton \$25.00	25.00	...
Machinery do,	per ton \$25.00	25.00	...
Grate Bars,	per ton \$25.00	25.00	...
The prices current for Rags &c., are as follows:			
Canvas, Linen,	per lb. \$0.45	4	...
White Cotton, New,	per lb. \$0.45	4	...
White, No. 1,	per lb. \$0.45	4	...
White, No. 2,	per lb. \$0.45	4	...
Seconds,	per lb. \$0.45	4	...
Soft, Woollens,	per lb. \$0.45	4	...
Mixed Rags,	per lb. \$0.45	4	...
Gunny bagging,	per lb. \$0.45	4	...
Juste butts,	per lb. \$0.45	4	...
Kentucky bagging,	per lb. \$0.45	4	...
Book Stock,	per lb. \$0.45	4	...
Newspapers,	per lb. \$0.45	4	...
Waste Paper and Scrap,	per lb. \$0.45	4	...
Kentucky Bale Rope,	per lb. \$0.45	4	...

OLD METALS, PAPER STOCK, &c.

The Old Metal market is dull this week and prices are not very firm; iron especially is weak. We have no important change to note in Rags and Paper Stock.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy,	per lb. \$0.21	3	...
Copper Bottoms,	per lb. \$0.16	17 1/2	...
Yellow Metal,	per lb. \$0.10	11	...
Brass, heavy,	per lb. \$0.12	11	...
Brass, light,	per lb. \$0.10	11	...
Composition, heavy,	per lb. \$0.15	10	...
Lead, heavy,	per lb. \$0.04 1/2	10 1/2	...
Lead, light,	per lb. \$0.04 1/2	10 1/2	...
Zinc,	per lb. \$0.05 1/2	10 1/2	...
Pewter, No. 1,	per lb. \$0.07	10 1/2	...
Pewter, No. 2,	per lb. \$0.07	10 1/2	...
Wrought Iron,	per ton \$35.00	37.50	...
Light do,	per ton \$25.00	25.00	...
Score Plate,	per ton \$25.00	25.00	...
Machinery do,	per ton \$25.00	25.00	...
Grate Bars,	per ton \$25.00	25.00	...

The prices current for Rags &c., are as follows:

Canvas, Linen,	per lb. \$0.45	4	...
White Cotton, New,	per lb. \$0.45	4	...
White, No. 1,	per lb. \$0.45	4	...
White, No. 2,	per lb. \$0.45	4	...
Seconds,	per lb. \$0.45	4	...
Soft, Woollens,	per lb. \$0.45	4	...
Mixed Rags,	per lb. \$0.45	4	...
Gunny bagging,	per lb. \$0.45	4	...
Juste butts,	per lb. \$0.45	4	...
Kentucky bagging,	per lb. \$0.45	4	...
Book Stock,	per lb. \$0.45	4	...
Newspapers,	per lb. \$0.45	4	...
Waste Paper and Scrap,	per lb. \$0.45	4	...
Kentucky Bale Rope,	per lb. \$0.45	4	...

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, March 2, 1880.

The manufacturing interests connected with the iron trade in Philadelphia are enjoying a season of prosperity beyond all precedent. The only trade which can be called quiet is that in stoves; all others are crowded with orders. Perhaps no better illustration of this can be seen than in the number of new buildings being erected, and additions made to others. There is scarcely a concern

in the city but find themselves cramped for space, and some who built quite extensively last year now find themselves more crowded than ever. Among these we may mention the Enterprise Manufacturing Co., the Philadelphia Screw Co., the American Machine Co., and others. The Enterprise Co. have just commenced on an extension of their premises which will cost near \$100,000, in addition to the great extension made during 1879. The American Machine Co. are now moving into the really magnificent premises just about completed at the corner of Lehigh avenue and American street. This will probably be one of the most complete buildings in the country, in all its appointments and conveniences, besides being of strikingly elegant appearance. The Screw Co., being more centrally located, are confined to a comparatively smaller space, but their growth is remarkable, and the amount of goods turned out is of increasing importance to the trade. The Star Lock Works, Hillebrand & Wolf, are also being considerably enlarged. The file establishments of Disston's, Barnett's, McCaffrey's and others, are still pushed to their utmost. The saw department of Henry Disston & Sons is also very active, with orders already on hand sufficient to employ their full capacity up to the middle of May. In shovels, forks, edge tools, &c., the demand shows no diminution whatever, and all branches of the hardware trade appear to be in a highly prosperous condition. The heavier branches, such as machine tools and machinery of every description, are equally well situated, and all the manufacturers report as much or more business than they can possibly attend to. The Baldwin Locomotive Works are as crowded as ever, and with a larger capacity than ever before, they are driven to the utmost to keep up with the demand. The extensive works of W. C. Allison & Son, in West Philadelphia, employing nearly 1000 hands, have been further extended by the erection on their premises of the Machinery Hall, removed from the Exhibition grounds. In the same vicinity Schleicher, Schmitt & Co. have been compelled to double their capacity, the demand for the "Silent" gas engine having entirely outrun their facilities for manufacturing. Their neighbors, Stokes & Parrish, are equally crowded with work on steam engines, elevators and similar work, and will shortly extend their premises. Goodell & Waters, wood-working machinery, are running full to their utmost capacity, and have been making several hours per day overtime for many weeks past, and are as full of work to-day as at any previous time. Stanley G. Flagg & Co. have just completed a very large building at Nineteenth street and Pennsylvania avenue, which will increase their capacity to nearly double. In the same locality George V. Cresson has made quite a large addition to his works. Dietzel, Eisenhardt & Co., manufacturers of power hammers, have recently moved into their new premises, designed and constructed to meet their special requirements. This, also, is a notably handsome and commodious building, and admirably adapted to meet the needs of their rapidly increasing business. Campbell & Rickards have also just moved into their new building, which is very complete in all its appointments. At Chester, Pa., the Chester Steel Casting Co. are doubling their capacity, and so on in every direction. The same condition of affairs exists in all other departments, and new buildings and extensions are going up in every part of the city. Shipbuilding is quiet. John Roach & Son, of Chester, have just commenced on a 3000-ton iron steamship, and at Wilmington, Del., there is a fair amount of work in repairs, besides several new river steamers, ferry boats, tugs, &c., being under way. At Cramp's shipyard, in Philadelphia, they have about 500 men employed. Until recently they have been busy on repairs and overhauling on a number of large vessels. They are now engaged in the construction of two steam yachts to cost about \$80,000 each. The length will be 180 feet; beam, 22 feet, and draft 12 feet. They have also just commenced on what is something of a new departure, viz., an iron schooner. She is to carry 400 tons, and will cost about \$30,000, and if the experiment is successful it may lead to quite an extension of business in this line. From points in the interior we get information of a very similar character, but in no department has there been greater improvement than in car building. The Harrisburg Car Co., for instance, doubled their business last year, and are still crowded with work. The Lebanon Car Manufacturing Co. show a still larger increase, with prospects of a demand which will require their utmost capacity for many months to come.

Pig Iron.—The quietness noted during the past few weeks still continues, although prices are steady and fairly maintained. The offerings are not important, and if anything like an active demand should set in, prices would probably take a fresh turn upward. The apathy among buyers is probably due to the fact that the majority bought heavily before the advance, and are not at present in need of additional material, and to the same cause may be attributed the unusually light offerings. The furnaces are kept steadily at work filling their contracts, so that the buying and selling from week to week is no indication of the actual condition of business. The advance of \$10 per ton within a very short period has entirely checked speculation, and until consumers are in actual need of supplies they are not likely to enter the market at present prices. It is believed, however, that the market will be put to a thorough test within the next 30 days. Contracts will be pretty well filled, and it remains to be seen whether buyers will renew their purchases at the advance or run along from hand to mouth, taking their chance of the market. The general feeling seems to be that sellers will control the position. Consumption is so large that supplies must be kept up, and as production so far has not exceeded the demand, there is little danger of accumulations, and if for a time purchases are for comparatively small lots, their frequent renewal will no doubt keep stocks within reasonable limits. The trade has reached a somewhat critical period; prices are high, imports are large, production is large, and, if the market is to be

sustained, consumption must remain in proportion. Arrivals of foreign iron will continue large and probably increase, unless the English markets improve. The extreme rates demanded for American irons some time ago has been an incentive to consumers to use the imported article, and after careful inquiry we find that there is far less prejudice against it than before. A good deal of talk has been made about the inferiority of English irons, but we are informed by very careful parties that they can use one-third to one-half without endangering their trade in the least; in fact, some say that they get more satisfactory results than by using American iron alone. For mill purposes we get a less favorable report, but as parties still use it more or less, it may be supposed that the article is not entirely worthless. The fact that foreign iron is being used quite largely for foundry purposes should not be lost sight of, however, as it cannot fail in the long run to have an important influence upon prices. In the meantime values in this market have yielded very little, and for the present the chances seem to be in favor of higher prices at an early date. Certain it is that an active buying movement would lead to an immediate advance, as there are no stocks of any account, the leading furnaces being sold close up and for some time to come. A good deal now depends upon the condition of business in the West. Large shipments have been made in that direction, and if buyers from there come in again it will probably be the turning point in the market. Considering the rapid advance in prices, it is remarkable how steady the market has been held. Comparatively speaking, very little iron has been sold at the high figures now quoted, and it will be an important step for consumers to make purchases at an advance of, say, \$10 per ton. Most of the iron now being used cost, probably, less than \$30, and if, as seems almost certain, the trade have to commence again in the neighborhood of \$40, it cannot fail to seriously influence values of all descriptions of iron manufacture. During the next two months a crisis of this kind will have to be passed, viz., the establishment of a new basis of values. That it will be done safely and easily seems pretty well assured, and for the present there is no apprehension in regard to the safety of the iron trade. Business during the week shows a slight weakness in foreign irons "to arrive;" spot lots are unchanged. Anthracite irons have sold as follows: No. 1 Foundry, \$40 @ \$41; No. 2 do., \$39 @ \$39.50; Gray Forge, \$38 @ \$39. There is a strong demand for futures, but sellers are not anxious to enter orders for any but moderate sized lots, and for these full prices are quoted. Bessemer irons are a shade lower; sales of considerable quantities reported at \$42.50, at furnace, for equal quantities Nos. 1, 2 and 3.

Muck Bars.—The market is quiet, and prices are a shade easier. Holders ask \$65, but it is likely that business would be accepted at about \$63. The Shawnee Rolling Mill Company, at Columbia, Pa. (Justice Cox, Jr. & Co., sales agents), will be started next Monday for making puddled Bars solely. They will pay \$5.50 for boiling, and be independent of the union. The mill is large and airy, and will be managed by men of long experience in the trade.

Structural Iron.—Inquiries during the week have been on a much larger scale than for some time past, and the prospects for business are very promising. Bridge work is likely to be very heavy this spring, and some large contracts will probably be given out at an early date. Under these circumstances it is not likely that prices can recede to any extent, although it is reported that desirable orders could be placed at some concessions from quoted rates, which are as follows: Angles, 4 1/2 @ 4.25; Beams, Channels and Tees, 4 1/2 @ 4.75.

Plate and Tank Iron.—There is more business doing, and the outlook is improving. The demand for Plates from parties employed in connection with railways, such as car, locomotive and bridge building, is very large, with every indication of its being continued for some time to come. Prices are steady, therefore, and it is not likely that any material concessions could be obtained from quoted rates, which are as follows: Tank, 4 1/2; C. No. 1, 4 7/8; C. H. No. 1 Shell, 4 1/2; Flange, 6 1/2; Flange Fire-Box, 7 1/2; Best Bloom, 8 1/2.

Sheet Iron.—The demand is improving, and manufacturers are very firm in their views as to prices. Stocks at mills are unusually low, and the current demand prevents accumulation. Higher prices seem probable at an early date, and manufacturers are not encouraging business unless for prompt deliveries. Prices are unchanged as follows:

Common Sheet, No. 26 to 28,	7 1/2	...
Common Sheet, No. 24 to 26,	7 1/2	...
Best Refined 1/2 advance on the above,	7 1/2	...
Best Bloom Sheets, No. 26 to 28,	8 1/2	...
Best Bloom Sheets, No. 24 to 26,	8 1/2	...
Common Red Plates, 3/16 to 1/4,	4 1/2	...
Blue Anodized, 3/16 to 1/4,	4 1/2	...
Best Bloom Galvanized, discount,	List price	...
Second quality, discount,	10 1/2	...

Bar Iron.—The demand has fallen off somewhat, and business during the past few days is reported dull. The irregularity of the market referred to last week in some measure continues, and probably will continue until all old stocks are absorbed. Parties who bought Bars at 2 1/2 to 3 1/2 can well afford to compete with manufacturers, but as these stocks become reduced, a more settled market may be expected. Manufacturers too, are in most cases working on Fig Iron bought before the advance, and business generally has not yet reached the present level of cost. When manufacturers have to pay \$40 for Fig Iron, or shut down their mills, and when merchants have to deal in Bars made on that basis of cost, there will be more uniformity in prices than there has been during the past three months. In the meantime we quote at 3 1/2 @ 4 1/2, market quiet.

Steel Rails.—There is not much change to report in Steel Rails; prices remain at about \$85 at mill, although lower figures are talked of. Manufacturers have inquiries for lots with deliveries extending into next year, but there is not much disposition to anticipate the distant future. The dullness

and slight reduction in prices abroad are reflected to some extent in this market, but there is little chance of any business being done this year below \$80. Whatever weakness there may seem to be at present is due to outside parties selling their contracts, rather than to any change in the condition of the market or in the views of manufacturers. It may be of interest to state

[illegible]

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 18, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, else responsible makers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

MILLERS FALLS CO.,
74 Chambers street, New York.

NATIONAL
Horse Nail Co.

MANUFACTURERS OF

FINISHED

(BRIGHT OR BLUED)

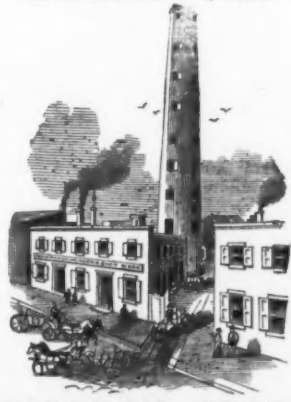


These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
VERGENNES, VT.

DURRIE & McCARTY, Agents,
No. 97 Chambers St., New York

The Oldest Shot Tower in America.
FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,

Manufacturer of

SPARKS'

American Chilled Shot,

Rivalling the English and all Others.

STANDARD DROP & BUCK SHOT
AND BAR LEAD.

121 Walnut Street, Philadelphia.

F. HABERMAN,

294 Pearl St., New York,

Manufacturer of the

Empire,

Brighton and

Favorite Oil

AND

Paragon Gas Stoves.



Illustrated catalogue and prices on application.

A. F. PIKE,

East Haverhill,

NEW HAMPSHIRE.

(ESTABLISHED 1823.)

HEADQUARTERS FOR SCYTHE, AXE, KNIFE,
HACKER AND TOOL STONES.



Twenty Quarries and Four Factories in New Hampshire and Vermont.

Strong, Clear Grit Stone
that will not glaze.

PRICES & QUALITY GUARANTEED

All Goods Genuine Brands.

My customers may rely upon being squarely dealt with and getting no poor, unsalable imitations.

LIST.

No. 1, Extra Indian Pond.
No. 1, " "
No. 2, " "
Premium,
Union.
White Mountain.
L'Étoile.
Diamond Grit.
Hacker (Round).
Lamolle.
Willoughby Lake.
Green Mountain.
Black Diamond.
Ragg.
Moving Machine.
Paper Mill Stone.
Vermont Darby.
" Chocolate.
Axe Bits.
N. H. Chocolate.
German Pattern.

Stones manufactured, labeled and branded in any manner desired.

Beware of Coarse Brittle Imitations.

SABIN MFG. CO.,

MONTPELIER, VT., MANUFACTURERS OF

DOUBLE-ACTING SPRING BUTTS,

SABIN'S LEVER DOOR SPRINGS, For heavy doors,

BOSS AND CROWN SPRINGS, For light doors.

Send for Catalogue.

RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I., and Buffalo, N. Y. Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, President.

C. H. PERKINS, Gen'l Manager

R. W. COMSTOCK, Secretary

Established in 1839.

Formerly L. & A. G. Coes

L. COES & CO.

Manufacturers of L. Coes'

GENUINE IMPROVED

AND MECHANICS

Wide Bar Full Length.

Wide Bar Full Length.

Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Handle.

None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St., & 81 Reade St., N. Y.
DURRIE & McCARTY, Sole Agents.

The 1880 Pennsylvania Lawn Mower

OUTSTRIPS ALL COMPETITORS.

LIGHT DRAFT AND EASILY ADJUSTED.

Every Machine Warranted to Work as Represented.

Points Claimed as being Meritorious:

Lightness combined with Strength in construction.
It runs more easily.
It will cut longer grass.
It is more durable.
It requires less repairs.
It cuts the grass more smoothly.
The attractive appearance of the machine.
It is the lightest machine in use, and all that is necessary to satisfy our customers of its superiority is to place it in competition with any other machine in the town in which they may reside.

PRICE LIST.

Width of Cutter.	Style.	Power required.	Weight.	Price.
10 inch.	A Child.	3/4 lb.	34 lb.	\$14.00
12 " "	A Lad.	3 1/2 "	38 "	18.00
14 " "	A Lady.	36 "	40 "	20.00
16 " "	One Man Size.	38 "	42 "	22.00
18 " "	" "	41 "	44 "	24.00

NEW MACHINES.

For Cutting Long Grass.

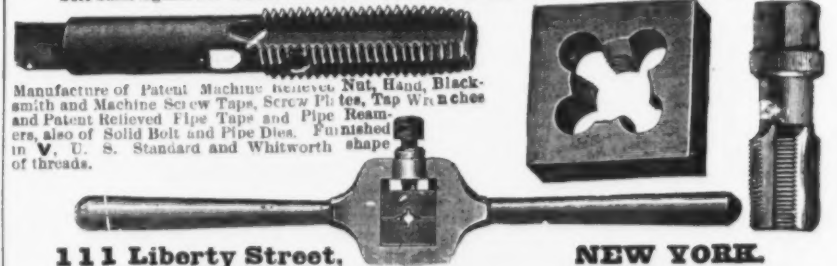
15 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 48 lb. \$23.
17 inch 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 51 lb. \$25.00

For Sale By

MARKLY, ALLING & CO., Chicago, Ill.
DURRIE & McCARTY, New York.
AMES FLOW CO., Boston, Mass.
PRATT & CO., Buffalo, N. Y.
SIMMONS HARDWARE CO., St. Louis, Mo.
HAMILTON & MATHEWS, Rochester, N. Y.
DUCHARME, FLETCHER & CO., Detroit, Mich.
LOCKHART, VANDORN & MILLER, Cleveland, O.
KRUSE & BAHLMAN, Cincinnati, O.
PRATT & CO., Elmira, N. Y.
LLOYD & CLARKE, La Crosse, Wis.

H. S. MANNING & CO.,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Reamer, Nut Hand, Blacksmith and Machine Screw Taps, Screw Files, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers, also of Solid Bolt and Pipe Dies. Finished in V. U. S. Standard and Whitworth shape of threads.

111 Liberty Street,

NEW YORK.

LANE'S MEASURING FAUCET.

Price, \$3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

MANUFACTURED EXCLUSIVELY BY
LANE BROS., Millbrook, N. Y.

General Agency, GRAHAM & HAINES, 113 Chambers St., New York.



RIEHLÉ BROS.

STANDARD

SCALES
AND
TESTING
MACHINES

Patent "Self-Adjusting" Railroad Track Scales, pronounced "the most accurate and durable" over all competitors at World's Fair, 1876. In use by Pennsylvania, Lehigh Valley, Baltimore and Ohio, and other Railroads. Patent Coal and Hay Scales. Warehouse and Platform Scales and Scales for all purposes. Machines for testing materials, all sizes.
Works, 9th St., at Master's Store, 32 S. 4th St., Philadelphia, Pa. New York Office at Liberty Street.



"DRAW CUT" BUTCHERS' MACHINES. Choppers, Hand and Power Stuffers, Lard Presses. Warranted thoroughly made and the Best in Use.
MURRAY IRON WORKS, Burlington, Iowa.



R. C. PURVIS,

Manufacturer of

Octagon

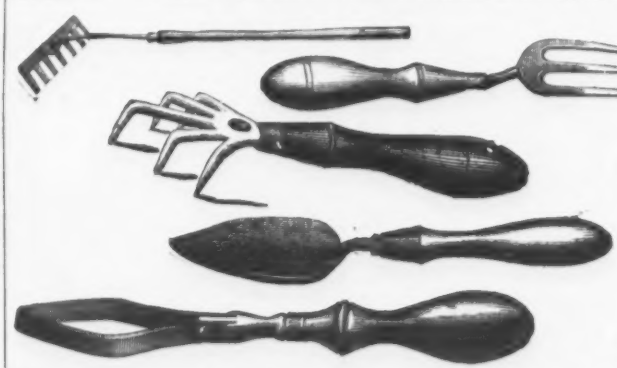
Tea Pots.

Rear of 407 Cherry St., Philadelphia, Pa.
Send for Price List.

Garden,
Floral &
Farm
TOOLS

CHEAP, OF

Enterprise
Mfg. Co.,
Geneva, Ohio.



IVES' PATENT BURGLAR PROOF DOOR BOLT.

Can be applied

wholly by

boring.



Sure protection

against burglars

or tramps

TO THE HARDWARE TRADE.—I invite the attention of the Hardware trade to my PATENT DOOR BOLT. Important features in this invention are its mode of application, sure protection and pleasing finish. Put up in boxes, one dozen each, nickel plate and bronze.

Agents, GRAHAM & HAINES, 113 Chambers St., New York.

A. T. YOUNG, 36 Pearl street, Boston; LATHAM & MATTHEWS, N. E. cor. Sixth and Commerce streets, Philadelphia, Pa.; S. H. & E. Y. MOORE, 165 and 167 Lake St., Chicago; C. B. CLARK MFG. CO., 285 to 291 Atwater St., Detroit, Mich.; GEO. H. GOSLING, 320 Sansome St., San Francisco, Cal. Send for Price List.

ROBERT H. IVES, Sole Manufacturer, 187 St. John St., New Haven, Conn.

Coke Merchant Iron: Mixed is worth, 26; Charcoal ditto, 27; Flooring iron, 25 @ 27; Sheet iron for building, 20; Puddled for boilers, 22. In the Haute-Marne there is an active demand, prices mean-while still rising; Common Merchant, 24 @ 25; mixed, 26; Charcoal, 27 @ 28; Machine No. 21 is held at 25 @ 26, and No. 22 at 26 @ 27. A fresh advance has taken place in Rolled Iron and Axes of 30 francs per ton; Rough Axes of 25 kilos, and over, 25; ready made ditto, 30; Rough, 14 to 25 kilos, 25; ditto, finished, 35; Threaded, 30 @ 35. The probability is that in all the current month all these prices will be raised another 20 francs per 1000 kilos. The Chain makers have raised their prices during the week 5 francs the 100 kilos; Black Chains, No. 21 and 22 are now worth 57 francs, and Polished ditto, 60 francs the 100 kilos. At St. Etienne the situation is a good one, nay an excellent one, without further improvement in prices. St. Dier offers of 25 francs for Merchant Iron have been declined. At St. Etienne there is just as strong a market; some works even hint that Bessemer Rails may soon cost 30 francs. Coal.—The difficulties in the way of transportation have still been great during the week; this has been particularly the case in the departments of the North and the Pas de Calais, where there is a lack of freight cars, and the mines there have every reason to complain. There is some complaint of a similar kind at St. Etienne. The Loire Basin has turned out in 1879 3,040,000 tons of Coal, against 3,173,109 in 1878; there has been a steady decline of production during the past few years; it is to be hoped that the current year may indemnify the region for past shortcomings in point of output.

BRUSSELS.

(Revue Universelle.)

BRUSSELS, Feb. 12, 1880.—Iron.—The Iron situation remains a highly satisfactory one. Aftage Pig commands, as to quality, 9 @ 10 francs the 100 kilos; Moulage No. 1, first quality, is worth 10 francs; second quality, 10.50. No. 1 Merchant Iron has risen to 22 francs. Iron Rails are unaltered, although large lots have been taken for America and more of them are at a time; it stands in need of, after accepting the tenders of the last adjudication, as follows: Acoz, 7000 tons; Monceau, 1000, and the Louviers, 1000 tons. From what precedes it will be seen that great strength prevails in our market; nor can we perceive anything yet, either in this country or abroad, leading to serious apprehensions of a sudden falling off in the demand, which seems to be founded thus far on actual wants brought about by exhausted stocks in the hands of consumers, who have been hesitating so long that at length they have been compelled to submit to prices which they could have avoided if they had more confidence when Iron and Steel went begging. The same experience, so often made, merely repeats itself in this instance. It is now discovered, it would seem, that consumers allowed their stocks to run much lower than the general Iron trade had any idea of. Coal has been in active request all along, at Liege in particular, but it cannot be delivered fast enough. At Charleroi also there has been a steady rise, and prices are quite irregular.

GERMANY.

(Borsenbulletin.)

HAMBURG, Feb. 14, 1880.—Metals.—The outlook in the Iron market daily improves, but opinions differ very much as to the probability of the durability of the revival we are witnessing. Meanwhile all kinds of Iron and Steel remain in brisk demand, prices improving uninterruptedly. At the top of the list there are Pig and Old Iron. These are hardly procurable, as the rolling mills are competitors for them all at a time; the consequence is that some rolling mills begin to look to England for Puddle Iron. The demand for Sheets, Rolled Iron and Wire assumes greater dimensions as we proceed; it is not an easy matter to execute orders for these goods, for most of the works, at Dortmund in particular, are engaged ahead for deliveries at home and abroad, especially for America. To the latter much is being done in Bessemer Steel Rails and Ingots; next to rails come the goods we have named above. While English works are so busy, German concerns are making satisfactory contracts in Italy. Bochum beat all others at Milan in the cheapness of Steel Axes for the Upper Italian railroads. The demand for hardware in the Harbin and other hardware regions extends to every article imaginable, and is remarkably brisk. Copper.—All metals, including Copper, are wanted. We quote in this city as follows: Dronheim, 78 marks the 50 kilos; Refined English Ingots, 50 @ 52, and Sheets, 45 @ 48. Banca Tin, 105 @ 108, and Australian Ingots, 105 @ 110; English, 105 @ 108. Lead.—English Pig, 21.20 @ 21.40; German ditto, 20 @ 20.50; Spanish, 21. Spelter, 21, spot and to arrive. Deliveries in Hamburg, 1879, 653,000 cwts., against 336,000 in 1878; 345,000 in 1877, and 176,000 in 1876.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Feb. 14, 1880.—No important transactions in Iron have transpired during the week in our own and the remaining markets. Blast furnaces in Austria display greater activity, partly to meet the existing demand, and partly in order to work a little ahead for the spring season. The demand for Car Iron and Sheets is moderate, yet prices have advanced in view of the higher cost of the raw material. The Iron works belonging to the Combination have raised prices this week 1.50 florins. Our machine shops are not very busy, but the prospect for them is decidedly an encouraging one, inasmuch as it stands to reason the increased activity in our mines and smelting establishments cannot fail to benefit them. A highly auspicious sign is the sudden activity developing in the hardware business in the Empire, even in the advance of the spring season; it is reasonable to expect, therefore, that we are approaching a prosperous campaign in it. Metals have been remarkably firm and trending upward; thus, Lead has risen 1 florin the 50 kilos, although consumption still lags back. Copper has advanced in a striking manner. Tin and Spelter have also improved somewhat, although not as much as has been the case abroad. At the close quotations are very irregular, and real values difficult to get at, we, therefore, prefer not to attempt any.

CHILI.

(Weber & Co.)

VALPARAISO, Jan. 2, 1880.—Copper.—Previous to the departure of the last mail there were sold two cargoes Lots at \$77, on board, combined with a 45% rail freight. The demand then subsided somewhat, but revived as soon as the conviction was gained that, if anything, the exchange would drop off a little, enabling holders to obtain better rates for their Copper. Sales sum up on board: 33,400 quintals Lots at \$77, 3117 Lamberts at \$72.50, 809 Chanaral at \$77.25, 1540 Nantoco at \$77.07, 21,000 quintals Regulat at \$74.40, on shore here, 1299 quintals Julian at \$76.00, and 2795 at \$76.50. Exchange, 90 days' sight on London, 303d. @ 32d.

EAST INDIES.

(Giffill, Wood & Co.)

SINGAPORE, Jan. 15, 1880.—Tin.—Supplies have been more abundant. Our market, in consequence of an American demand and an advance in London, became very active this week, and prices advanced to \$29 per picul. Yesterday, however, buyers held off, waiting for further news, and sales being rather pressed, prices declined to \$28.25 per picul. The exports from the Straits last month to the United States reached the extraordinary figure of 170 tons; so far this month 530 tons have gone forward, 220 by direct steamers and 310 tons via London freights. The supply of tonnage has been equal to the demand, and rates are steady. For New York the Hiram Emery, just arrived from China, loads on charterers' account. The Amy Turner has also arrived and is loading at 35 @ 40. The Edward Percy has taken the berth, and the Dreadnought has cleared for New York with any tin aboard. The shipments from the Straits to the United States in 1879 have been 120,116 piculs of Tin against 68,731 in 1878; 69,365 in 1877; 62,677 in 1876; 63,277 in 1875; 45,746 in 1874; 37,758 in 1873; 61,353 in 1872; 49,868 in 1871, and 60,304 in 1870. Exchange is steady at 1/10, @ 1/10 for six months' sight credit draft on London.

(Schmidt, Kustermann & Co.)

PENANG, Jan. 9, 1880.—Tin.—The market opened

quietly with light sales at \$26.50 @ \$27 per picul, but soon a more active demand manifested itself for the United States, causing prices to recover to \$27.50, at which rate quite a despatch business was done. The purchases for Europe and America sum up some 7500 piculs, while for China only 450 piculs have been taken at \$26.75 @ \$26.80. The market closes firm to-day at \$27.75, with stock in bazaar of about 2000 piculs. Exchange has been fluctuating during the fortnight, rates varying between 1/10 @ 1/10 for 4 months' bank bills.

P. L. WEIMER'S BLAST FURNACE ENGINEERING WORKS.

Specialty: Blast Furnace Erection,
Rebuilding and Repairs.

Plans and Specifications prepared for
Anthracite, Coke or Char-
coal Furnaces.

Contracts made or placed for new plants and re-
pairs, or for modernizing works now in place.
Blowing Engines, Hot-Blast Stoves and Furnace
Fixtures of new and improved designs made to
order. Address

P. L. WEIMER,

LEBANON, PA.

Or, 152 South 4th Street, Philadelphia.

THE "ECLIPSE" Hand Fan Blowers.

Every machine guaranteed or no sale.
Is now improved by lever attach-
ment. Works precisely like bellows
lever, or, if preferred, crank can be used.
The trade are invited to write for terms,
descriptive circulars, &c.

EXHAUST FANS

for ventilating mines.

Address,
EZRA F. LANDIS,

Sole Manufacturer,

LANCASTER, PA.

Bergen Port Spelter

MINES: WORKS & FURNACES

Lehigh Valley, Pa. Bergen Port, N. J.

The only Miners and Manufacturers of

PURE

LEHIGH

SPELTER

From Lehigh Ore.

Especially adapted for

Cartridge Metal and German Silver.

Also manufacturers of

BERGEN PORT OXIDE ZINC.

superior for Liquid Paint on account of its body

and wearing properties.

F. OSGOOD & CO., Proprietors.

E. A. FISHER, Agent, 13 Burling Slip, N. Y.

No. 35

BROWNING, SISUM & CO., 85 Chambers St.,

Manufacture

Belt Hooks, Cutters, Spring Keys, D Rings,

Staples, and everything pertaining to wire bending

Factory, BROOKLYN.

ANCHOR BRAND

AXLES.

For all Styles Carriages and Wagons.

Annual production 150,000 sets.

SHELDON & CO., Auburn, N. Y.

ENTERPRISE Mfg. CO. of PA.

PATENTED HARDWARE MANUFACTURERS & IRON FOUNDERS,

THIRD and DAUPHIN STS., PHILADELPHIA.

New York Branch House with

DURRIE & McCARTY, 97 Chambers Street.

Decoctions, Infusions, Syrups, &c.

TO THE DRUGGIST

Available

IN THE HOUSEHOLD, STORE AND RESTAURANT

IF MAKING

Fruit Butters, Wines & Jellies.

Enterprise Combination Fruit Press.

Price, \$3.50.

SPECIALTIES.

Enterprise Patent Cold Handle Double Pointed

SMOOTHING & POLISHING IRONS

CHAMPION TOBACCO CUTTERS,

PATENT MEASURING FAUCETS,

SELF-WEIGHING CHEESE KNIVES,

&c., &c.

SPECIALTIES.

AMERICAN

COFFEE, SPICE & DRUG MILLS,

SAUSAGE STUFFERS,

FRUIT, LARD AND JELLY PRESSES,

CHAMPION DRIED BEEF SHAVERS,

Bung-Hole Borers,

&c., &c.

W. G. FOSSICK,

Engineer and Iron Agent,
86 Cannon St., London, England.

Iron and Steel Rails,

Bars, Angles, Plates,

Pig Iron & Puddled Bars.

Old Rails, Scrap Iron, Steel Rail Ends

c. f. i. American, or f. o. b. European ports.

Contracts negotiated on the most favorable terms.

Bankers: Barnetts, Hoares & Co., London.

THOMAS MORTON,

65 Elizabeth Street, New York,

Manufacturer of Copper and Iron

SASH CHAINS.

With Patent Attachments.

Warranted for ten years. Chains of any size made

to order, and trade supplied with liberal discount.

BUFFALO SCALE CO.,

BUFFALO, N. Y.

Manufacturers of

R. R. Track Scales, Hay Scales, Coal

Scales, Grain Scales, Platform

Scales, Counter Scales, &c.

Send for price list, stating what you want.

The Sugar Maker's Friend.

Agents wanted

in every Sugar

District to can-
vass for the sale

of Post's Patent Metallic Eureka Sap

Spout and Bucket Hanger. Samples,

Circulars and Terms sent postpaid

on receipt of 25 cents. Address

C. C. POST, Manuf. & Patentee, Burlington, Vt.

Call for them at your hardware stores.

AN ENTIRE NEW MAKE OF

MINE LAMP.

THREE DIFFERENT

SIZE SPOUTS.

SEND

15 CENTS

FOR SAMPLE

TO

LEONARD BROTHERS,

SCRANTON, PA.

PEERLESS

Damper Regulator.

Superior in every respect to all other regulators.

The greatest fuel-saving appliance ever invented.

Insures safety from explosion. In ordering men-
tion steam pressure. Illustrated Catalogue sent
on application. We set it up and guarantee per-
formance. Price \$75.00.

AMERICAN STEAM APPLIANCE CO.

Sole Manufacturers,

13 and 15 Park Row, New York.

NATIONAL

BOLT

CUTTERS

GUARANTEED AHEAD OF ALL

OTHERS FOR MANUFACTURERS &

MACHINISTS

SEND FOR CATALOGUE

182 SENECA ST. CLEVELAND, O.

CUMMINGS' ARCHITECTURAL DETAILS,

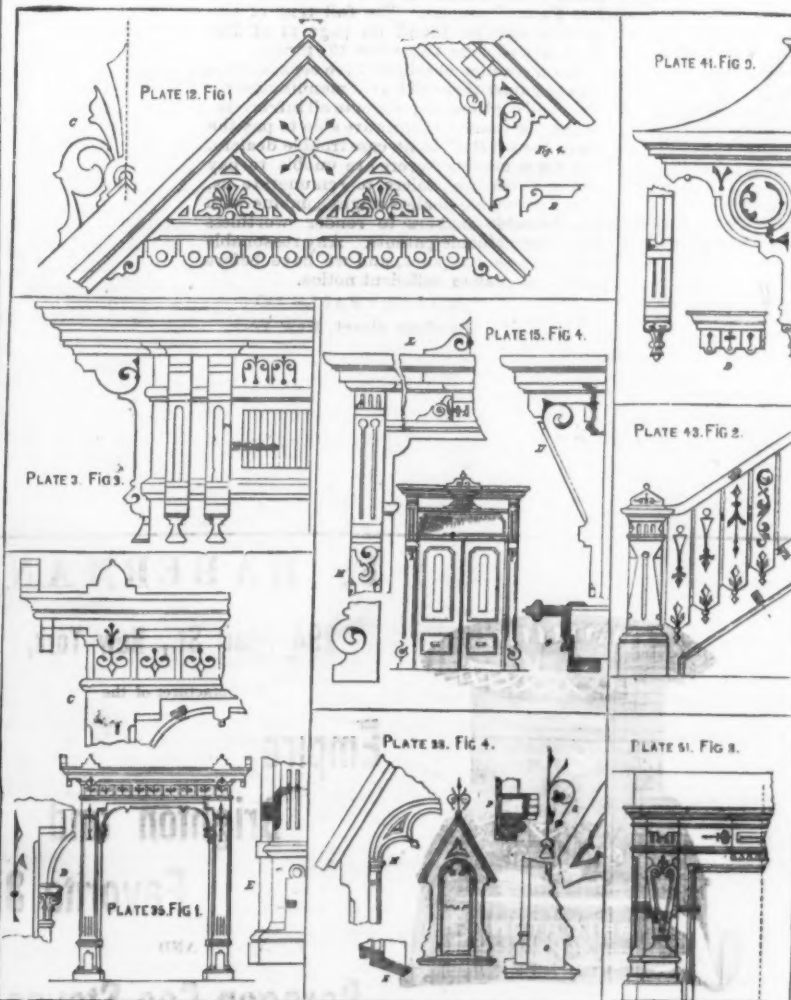
CONTAINING 387 DESIGNS AND 967 ILLUSTRATIONS

Of the Various Parts needed in the Construction of Buildings,
Public and Private, both for the City and Country; also
Plans and Elevations of Houses, Stores, Cottages,
and other Buildings.

By M. F. CUMMINGS, M. A., Architect.

Associate Author of "Architecture, by Cummings & Miller."

(CUTS REDUCED FROM PLATES INDICATED.)



Crown Fluting Machine.



Sizes (length of Rolls), 4 1/2 in., 6 in. and 8 in., with 10, 12, 15, 18, 22, 26 or 30 Flutes.

Original "Knox" Fluting Machine.



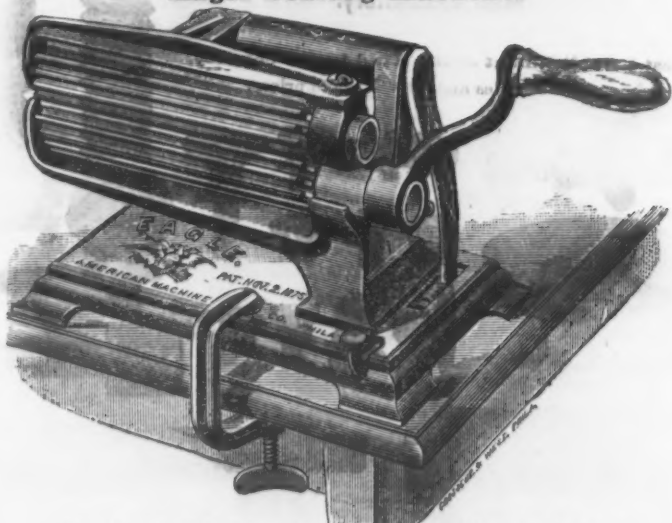
Sizes (length of Rolls), 6 in., with 10, 12, 15, 18, 22, 26 or 30 Flutes.

American Fluting Machine.



Sizes (length of Rolls), 5 in., 6 in., 7 in., with 12, 15, 18 or 22 Flutes.

Eagle Fluting Machine.



Sizes (length of Rolls), 3 1/2 in. and 5 1/2 in., with 15 or 18 Flutes.

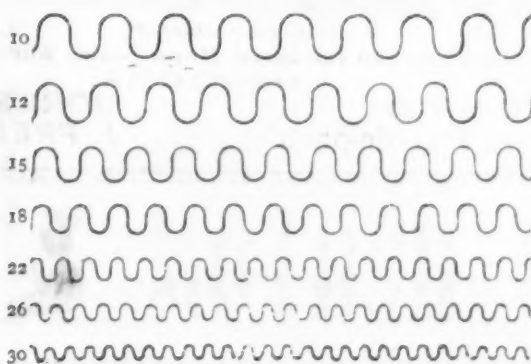
THE AMERICAN MACHINE Co., MANUFACTURERS OF HARDWARE SPECIALTIES.

OFFICE AND FACTORY:

No. 1916 to 1924 NORTH FOURTH ST.,
PHILADELPHIA, PA.

BRANCH HOUSE:

No. 128 Chambers Street, New York.



SPECIALTIES:

Crown Fluting Machines,

Star Fluting Machines,

Eagle Fluting Machines,

American Fluting Machines,

Original 'Knox' Fluting Machines

Crown Hand Fluters,

Crown Plaiting Machines,

Bickford Portable Pump,

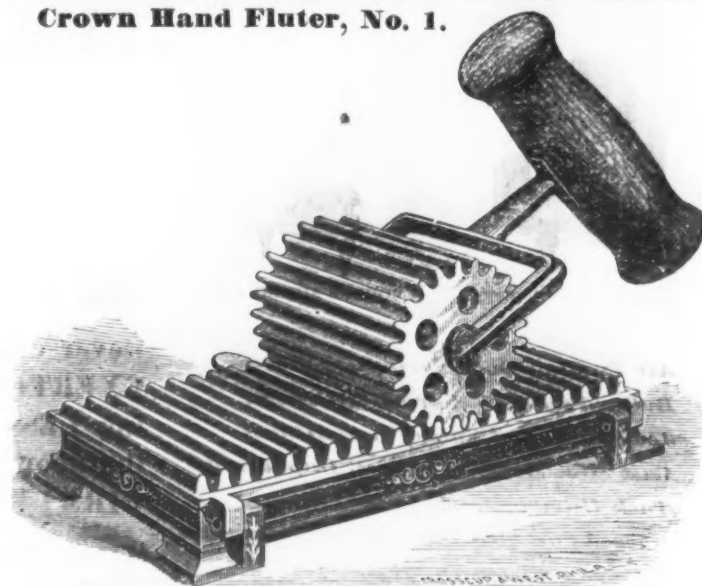
Crown Christmas Tree Holders,

Crown Can Openers,

Mrs. Potts' Patent Crown Sad Irons

&c., &c., &c.

Crown Hand Fluter, No. 1.



Size, Baseplate, 6 1/2 in. long, 3 1/4 in. wide. Roll 2 3/4 in. diam.

Crown Hand Fluter, No. 2.



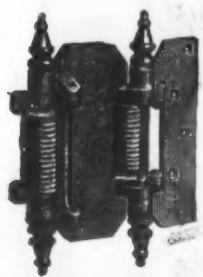
Size, Baseplate, 6 1/2 in. long, 3 1/4 in. wide. Roll 1 3/4 in. diam.

Crown Hand Fluter, No. 3.

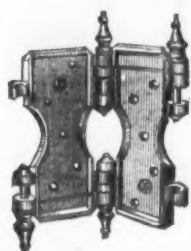


Size, Baseplate, 5 1/2 in. long, 3 in. wide. Rolls 1 3/4 in. diam.





DOUBLE ACTING BUTT.



DOUBLE ACTING BLANK.

*Air Cushion Door Springs,
Bullard's Patent Carpet Stretchers,
Jewett's Patent Spring Gate Hinges,
Cast Steel Mincing Knives, Hammered,
Tack Hammers and Claws,
Forged Cast Steel Screw Drivers, all varieties,
Garden and Ice Tools,
Carpenters' Awls, Cleavers, Cake Turners,
Box Scrapers,
Wagon Jacks.*

THE COWLES HARDWARE COMPANY,

Unionville, Conn., U. S. A.,

Manufacturers of Household Hardware

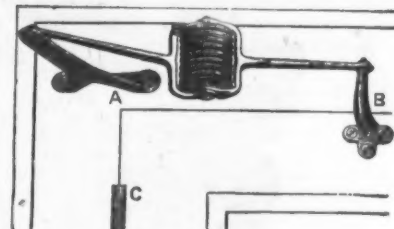
Geer's Single and Double Acting Spring Butts and Blanks.

Reverse in principle. Placing the power where most needed, viz.: **EXERTING** their **GREATEST FORCE** when the door is **CLOSED**; offering **LESS RESISTANCE** the **WIDER** the door is **OPENED**; **RETAINING** the door **OPEN** after passing the right angle; **HOLDING** the door **UP FIRMLY** at the **TOP**.

Also, **BLANK BUTT**, designed to be used in combination with our Double Spring Butts on Inside Doors of Dwelling Houses, Churches, Hotels, Restaurants or in any position where the doors are not subject to strong currents of air. With our New Blank Butt we furnish for inside doors the most effective as well as the cheapest Spring Butt in market. **Butts & Blanks for Screen Doors a specialty. Hercules Springs for Screen Doors a specialty.**

Perfect in Action, Very Low in Price.

Send for Catalogue or Circulars with price lists. Mention this paper.



HERCULES

**Reverse Action Door
Spring & Retainer.**

New principle, distinct from all others. Holds the door open as well as shut. Exerts its greatest force at the closing point. The best Spring in market.

THE IMPROVED HOWE SCALES.

Made in Every



Variety



Works at Rutland, Vt.

and Adapted to any



Standard.

The highest Awards have invariably been given the Improved Howe Scales wherever exhibited in competition with other makes.

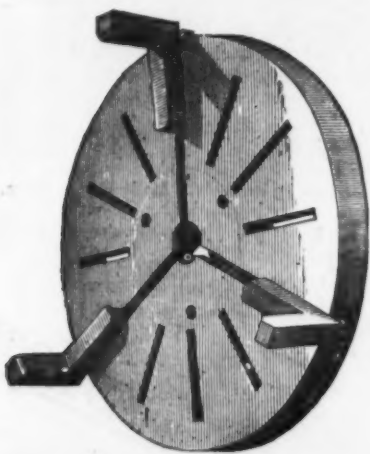
PAGE, FARGO & CO., 325 Broadway, New York.

PAGE, FARGO & CO., 213 Market Street, Philadelphia.

OFFICES:

BORDEN, SELLECK & CO., 97 Lake Street, Chicago.

J. FRED. DENNIS, 8 & 9 Holborn Viaduct, London.



Front View.

THE HORTON CAR WHEEL CHUCK.

This Chuck can be attached to a boring machine table, or lathe, and will hold a car wheel 37 inches in diameter and less. The jaws are made long to fit both tread and flange of car wheels, thus truing them both ways. For general machine work it is very useful, and will hold firmly any work that can be held in a Chuck.

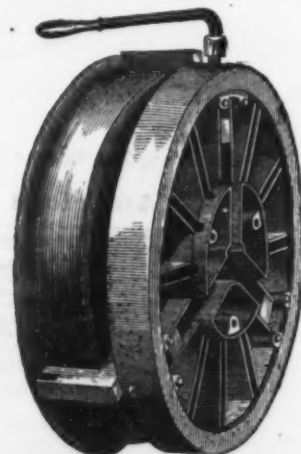
THE E. HORTON & SON CO.,

MANUFACTURERS OF

THE HORTON

LATHE CHUCK

Windsor Locks, Conn., U. S. A.



Back View.

THE HORTON CAR WHEEL CHUCK.

This cut represents the Horton Car Wheel Chuck holding a car wheel in proper position for boring, the flange and tread of the wheel assuming a true position on the jaws. For accuracy and ease of operation this Chuck has no equal.

THE HARTFORD MACHINE SCREW CO.,

MANUFACTURERS OF

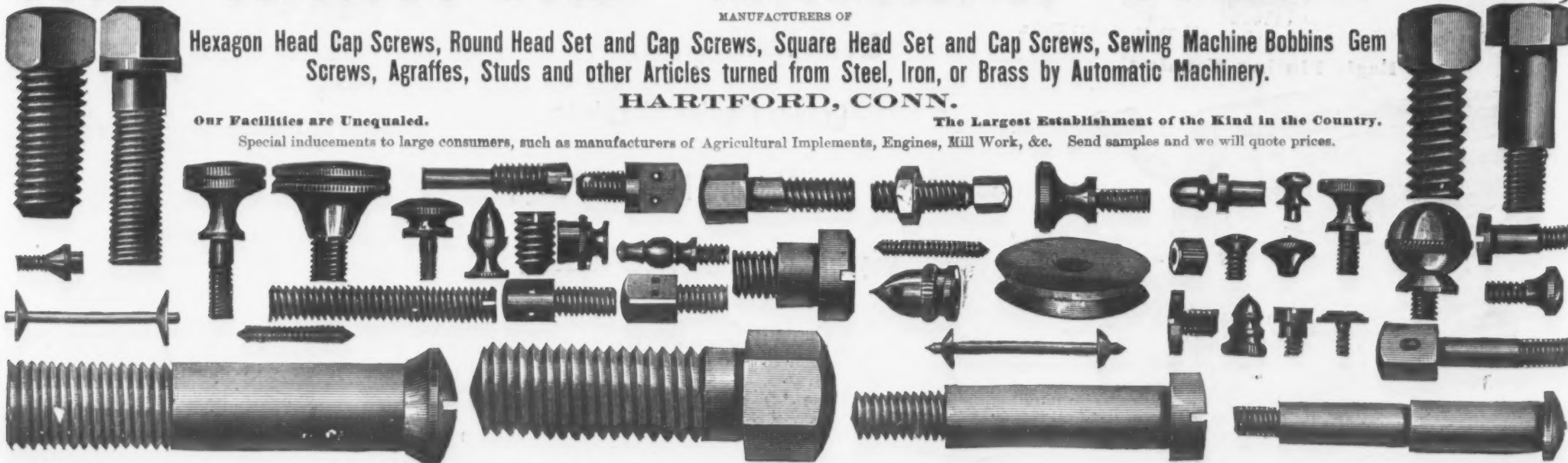
Hexagon Head Cap Screws, Round Head Set and Cap Screws, Square Head Set and Cap Screws, Sewing Machine Bobbins Gem Screws, Agraffes, Studs and other Articles turned from Steel, Iron, or Brass by Automatic Machinery.

HARTFORD, CONN.

Our Facilities are Unequaled.

Special inducements to large consumers, such as manufacturers of Agricultural Implements, Engines, Mill Work, &c. Send samples and we will quote prices.

The Largest Establishment of the Kind in the Country.



GROOM SHOVEL CO.,

MANUFACTURERS OF SUPERIOR

SHOVELS, SPADES AND SCOOPS.

SPECIALTIES:

Mining Shovels, Hammered Solid Steel
Railroad Shovels and Spades,
Locomotive & Sand Scoops.

OFFICE,

912 Washington Ave.,

FACTORY,

1031 North Main St.,

SAINT LOUIS, MO.

COULTER, FLAGLER & CO.,

87 Chambers and 69 Reade Sts., New York,

Hardware

Manufacturers'

Warehouse.



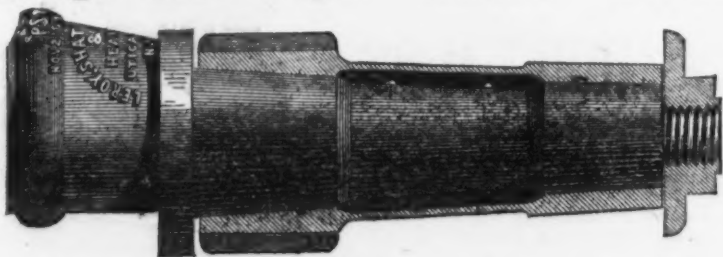
Forsyth's Patent Roller Skate. Patented Feb. 12, 1878.

Office and Warehouse of Union Hardware Co.; New Haven Tool Co.; Draw Knives, Chisels, &c.; Deuse Bros., Bts., Corkscrews, &c.; Richardson Bros., Saws of all kinds; Brooks Edge Tool Co.'s Axes, Hatchets, &c.; M. Price, Hatchets, &c.; J. & W. Rothery, Extra Hand Cut Files; L. D. Frost, Carriage Bolts, Bedstead and Norway Iron; Cowles Hardware Co., Screwdrivers, Mincing Knives, &c.; Rider, Wooster & Co., Anti-Friction Barn Door Hangers, &c.; H. B. Hawley, Shears of all kinds; Walden Knife Co., Pocket Cutlery; American Screws; N. Y. Anti-Friction Metal Co.'s Rabbitt Metals; Howard, Razor Strops; C. Forschner, Spring Balances; F. Lowen- traust & Co., Dividers, Calipers, &c.; Shepard Hardware Co., Plasters, Blind Hinges, &c.; Saxton & Amedon, Braces, all kinds; Bevin Bros. Mfg. Co., Bells, all kinds; H. H. Parsons & Bro., Pliers, Nippers, &c.; C. L. Griswold, Cast Steel Bits; Lancaster Lock Works, Jail Locks.

LEROY, SHATTUCK & HEAD,

Manufacturers of

Carriage and Wagon Builders' Hardware,



AND

The Celebrated "UTICA" (xx) SKEINS and BOXES.

TRADE

Also, we are Sole Manufacturers of the

PLUMB SPOKE TAPER SKEINS AND BOXES.

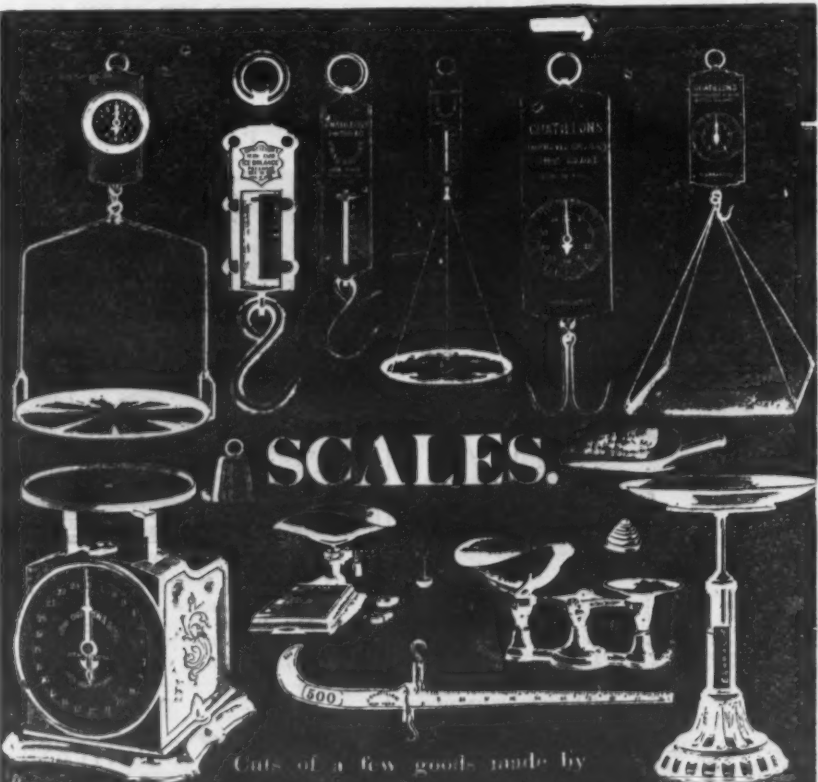
PS
T
MARK.

42 sizes Common Skeins and Boxes.
22 " Seamless " " "
20 " Ex. Heavy " " "

21 sizes Double Extra Skeins and Boxes.
22 " Brass Bearing " "
22 " Rabbitt Bearing " "

13 sizes Old Taper Skeins and Boxes.

Furnace and Office, 105 BROAD STREET, UTICA, N. Y.



SCALES.

Cuts of a few goods made by

JOHN CHATILLON & SONS, NEW YORK, U.S.A.

PATENT
Elliptic Spring Whistles



FOR
SPEAKING TUBES.
Patented April 25th 1879.

We call the attention of the trade to the whistle for speaking tubes, represented in above cut, as being superior, in a mechanical point of view, on account of the

PATENT ELLIPTIC SPRING,

which is much less liable to break and get out of order than the spiral spring usually used. These whistles being made entirely of metal, are very strong and durable. They are offered in a variety of styles at very reasonable prices. Send for illustrated circular and quotations. We also invite an examination of our PATENT REVERSIBLE DOOR LOCKS, which by their peculiar construction, combine simplicity, strength and durability. In these Locks the combination of the Patent Lever and Spring renders the latch movement very easy and prompt in action. Illustrated catalogues and price lists furnished on application.

TRENTON LOCK AND HARDWARE CO.,

Manufacturers of Superior Building Hardware.

Trenton, N. J.

AGENTS.

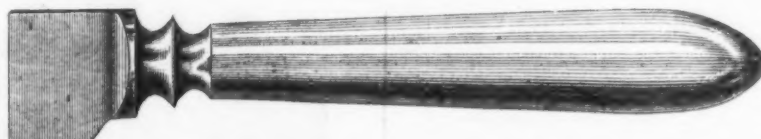
JAMES M. VANCE & Co., 211 Market St., Philadelphia, Pa.; JAMES MARSHALL, 48 Warren St., New York

GREENFIELD TOOL CO.

(GREENFIELD CUTLERY CO.)

Greenfield, Mass., U. S. A.,

MANUFACTURERS OF



Fine Table Cutlery.

Solid Handled, Bone, Ivory, Rubber and Wood, Solid Steel Silver Plated.



PATENT CONCAVE FORGED OX SHOES.



ALSO,

PLANES, PLANE IRONS, &c.



The Original and Genuine.

ALL OTHERS ARE IMITATIONS.

OVER 100,000 NOW IN USE.

JEWETT'S PATENT WATER FILTER

With Porcelain-Lined Cooler.

ACKNOWLEDGED THE ONLY COMPLETE AND SUCCESSFUL FILTER AND COOLER IN THE WORLD.

ISAAC S. WILLIAMS & Co., 726 Market Street, Philadelphia, Pa.—We have sold your "Patent Water Filter" for the last six years. Our sales in that time having reached upwards of five thousand and in no instance have we heard of any failure in performing all you claim for them.

Address
SEND FOR CIRCULAR.
JOHN C. JEWETT & SONS,
BUFFALO, N. Y.

SHELTON & CO.,

Manufacturers of every variety of



Carriage, Tire, Machine, Plow, Stove and Spring Bolts, Coach and Bed Screws, &c.

BIRMINGHAM, CONN.

Coulter, Flagler & Co., Agents, 87 Chambers Street, New York.



VERMONT SNATH CO.,

MANUFACTURERS OF THE

No. 00 and 000 Patent Swing Socket Snaths.

SPRINGFIELD, VERMONT.

Represented in New York by LAMSON & GOODNOW MFG. CO.

EMPIRE FORGES IMPROVED without Belts, Bellows, Crank Pins, Dead Centers or Back Motion. Send for circular. EMPIRE PORTABLE FORGE CO., COHOES, N. Y.

PAYSON MFG. CO.,

CHICAGO, ILL.



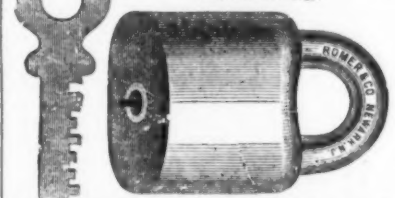
Perfect Sash Locks,

For Sale by the following Dealers:

FERNALD & SISE, Agents.....New York City.
SAM'L G. B. COOK & CO., Agents.....Baltimore, Md.
A. T. YOUNG, Agent.....Boston, Mass.
HAMILTON & MATHEWS, Agents.....Rochester, N. Y.
CHAS. HUMES & CO., Agents.....St. Louis
WEND & CO.....Buffalo, N. Y.
WM. BINGHAM & CO.....Cleveland, Ohio
ABBOTT, MONTGOMERY & STONER, Columbus, " "
LEWIS & GODMAN....." "
ROGERS, ENGEL & CO.....Dayton, " "
GEO. F. ROHR.....Cincinnati, " "
T. A. PICKERING....." "
J. B. SCHROEDER....." "
TARWATER, SNYDER & HANKINS.....Louisville, Ky
ORRILL BROS. & CO.....Memphis, Tenn
VAGEN & NEW.....Indianapolis, Ind
THOS. M. CLARK & CO.....Atlanta, Ga
MORRISON, BAIN & CO....." "
RICE, BORN & CO.....New Orleans, La.
H. J. COOK & CO.....Topeka, Kan.
W. W. DIEHL.....Springfield, Ohio
BOGMAN & VINAI.....Boston
E. T. DUKE.....Omaha, Neb.
KURSHEEDT & BIENVENU....." "
BLISH, MIZE & SILLIMAN.....Atchison, Kan.
D. & C. L. BAUM.....Lincoln, Neb.
DUNCAN, WYETH & CO.....Kansas City, Mo.
W. M. WYETH & CO.....St. Joseph, " "
SHULTZ & HOSEA....." "
W. A. L. THOMPSON.....Topeka, Kan.
C. A. ROBERTS & CO.....Denver, Co.
A. E. FRANZEL.....Wheeling, W. Va
JOHN PRITZLAFF.....Milwaukee, Wis
A. E. WALLSCHLAGER & CO....." "
F. KIECKHEFER & BRO....." "
J. KNOERNSCHILD.....Dubuque, Iowa
J. MACLAY & CO.....Detroit, Mich.
STANDART BROS.....Saginaw City, " "
D. H. JEROME & CO.....Pittsburgh, Pa.
JOSEPH WOODWELL & CO.....Galveston, Tex.
J. F. SMITH & BRO.....Woolwich, London S. E. England.
GEO. WHALE....." "
Also all Dealers in Chicago.

Romer & Co.

Established 1837.



Manufacturers of Patent Scandinavian or Jail Locks, Brass Pad Locks for Railroads and Switches. Also Patent Stationary R. R. Car Door Locks. Patent Piano and Sewing Machine Locks. 141 to 143 Railroad Avenue, NEWARK, N. J. Illustrated Catalogue sent to the trade on application.

HAMMOND'S Window Springs

Support and lock sashes of all kinds and sizes; are very convenient, simple and durable; are easily and quickly operated, and always sure to hold sashes in most desirable positions. Lower spring can be used in connection with a sash having weights, as a lock. For sale by most Philadelphia wholesale houses. Circulars give full instructions. Samples mailed to the Trade free.
W. S. Hammond,
Levittown, Pa.

W. R. OSTRANDER, Manufacturer of PATENT Speaking Tube Whistles, Bell Hangers' Hardware.

Send for revised catalogue. 19 Ann Street, New York.

MINERS' CANDLES.

Superior to any other Light for Mining Purposes. Manufactured by

JAMES BOYD'S SON, Nos. 10 & 12 Franklin St., New York. Coal.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,

303 Walnut St.,

PHILADELPHIA,

No. 111 Broadway, New York.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves and firms connected with us, viz.

A. Pardee & Co. { HAZLETON, CRANBURY, SUGAR LOAF.
Pardee, Bro. & Co. LATTIMER.
Calvin Pardee & Co. HOLLYWOOD.
Pardee, Sons & Co. MT. PLEASANT

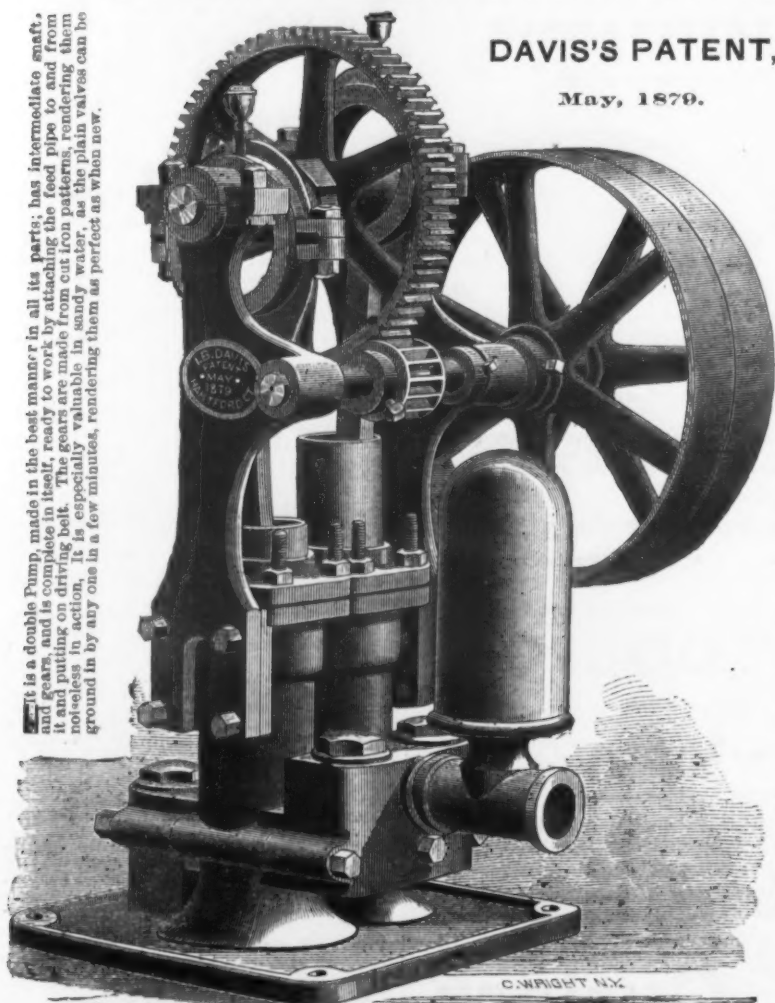
THE HOBOKEN COAL CO., Dealers in

SCRANTON, LEHIGH and other COALS. Retail Yard on D. L. & W. Railroad, cor. Grove and 14th sts., Jersey City. Coal delivered direct from shutes to cars and wagons. Families and manufacturers supplied with the best qualities of Coal at the lowest rates. Offices: At yard cor. Grove and 14th sts., cor. Day st. and Newark av., Jersey City. Room 18, 111 Broadway, N. Y. General Office, Bank Building, cor. Newark and Hudson sts., Hoboken. F. O. Box 247, Hoboken.

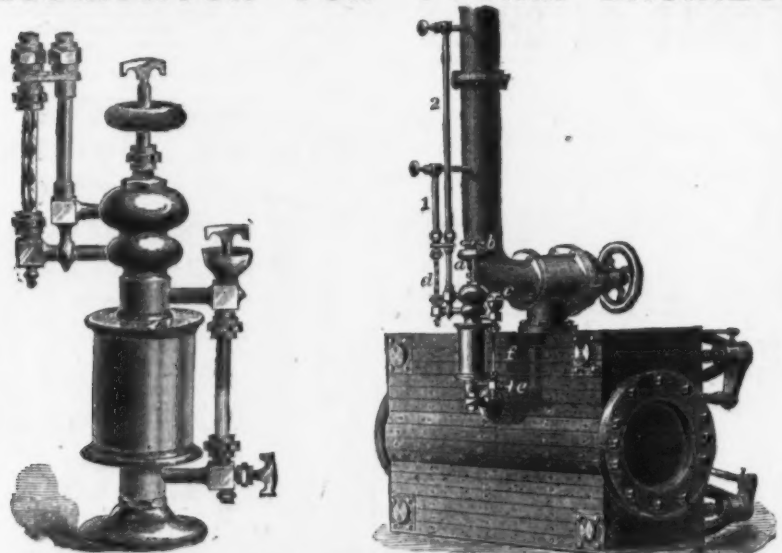
ECONOMIC PATENT BOILER FEED PUMP

DAVIS'S PATENT,
May, 1879.

It is a double pump, made in the best manner in all its parts; has intermediate shaft, and is complete in itself, ready to work by attaching the feed pipe to and from it and putting in action. It is especially valuable in sound and tight boilers, and can be ground in by any one in a few minutes, rendering them as perfect as when new.

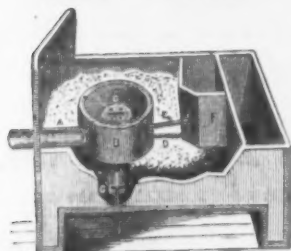


I. B. DAVIS, Maker, Hartford, Conn.

HARPER'S
LUBRICATOR FOR STEAM ENGINES.

This invention is an improvement upon that class of Lubricators in which the lubricating material is floated from the reservoir by the condensed steam passing into the reservoir, and may be applied to all kinds of Steam Engines, by introducing the Lubricant into the steam pipe so that it thoroughly lubricates and prevents the wear of cylinder, piston, valves and rods, thereby saving oil, coal and packing, and adding greatly to the easy working of the engine. The ultimate saving in repairs to the engine is many times greater than the cost of Lubricator. The glass tube connected with the reservoir indicates the quantity of oil in the reservoir; the upper glass tube the quantity of oil escaping. The quantity of oil admitted to the engine can be regulated with certainty. We might claim great economy of oil; that we leave with the Engineer. This invention is in practical operation, and is very highly recommended by the best engineers, and all now using it. This invention is secured by Letters Patent of the United States, dated Sept. 26, 1871, and April 4, 1877. Information concerning the Lubricator may be obtained from our Agents, or by addressing

THE HARPER STEAM LUBRICATOR CO., Westville, Conn.

BAYLISS' HOT BLAST
WATER TUYERE
AND FORGE.

The side of the forge is broken away to show the construction of the TUYERE.

This Tuyere can be placed in any Forge, with or without water. This Tuyere has been in use for the past ten years, has stood the test, and exceeds by far any made at the present time.

These Tuyeres and Forges have obtained for the last ten years the first premium, the medals of special award and superiority at the American Institute Fairs.

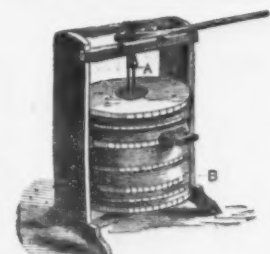
I respectfully refer to the following order:

Dear Sir:—Please send us at once Ten Tuyeres, small size.

BREWSTER & Co., of Broome st., Broadway, 47th to 48th sts., N. York.

These Tuyeres are used exclusively in the above establishment.

JOHN BAYLISS, Patentee and Manufacturer,
159 East 54th St., New York.



A 30-inch Bellows, No. 4, is equal to a 40-inch pear-shaped Bellows, and a boy of 5 years can work them.

Copy of the Judges' Report in Department V, Group 2, at the 45th Exhibition of the American Institute, held in the City of New York, October, 1876. No. 664.—Blacksmith's Triple Action Cylindrical Bellows.

John Bayliss, No. 147 East 54th st., New York. That a comparison and an actual test of the above named bellows in competition with the Fan Bellows exhibited in the same group convinces your judges that for Blacksmith's use the bellows is not only far superior to the hand bellows exhibited and desired to be used for the same purpose, but that it is superior also to bellows heretofore used. We regard it as a decided advance in the art, and unanimously recommend it for the highest award consistent with the rules adopted by your board for such exhibits.

Silver Medal Awarded.

Send for Circulars and Price List.



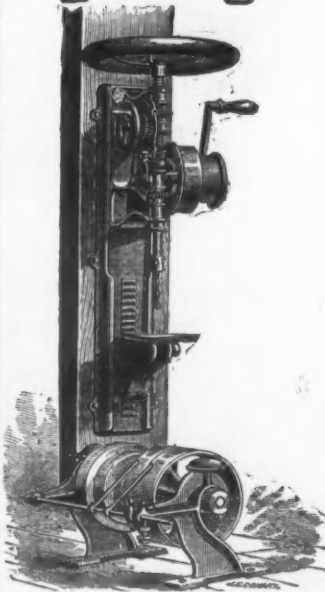
Portable Forge and Bellows.

They are especially adapted for Railroads, Ship, Steam Boiler, Carriage, Bridge Building, Horse Shoers, Jewelers, Pipe Fitting and Locksmiths.

There are three sizes, the cut representing the smallest size.

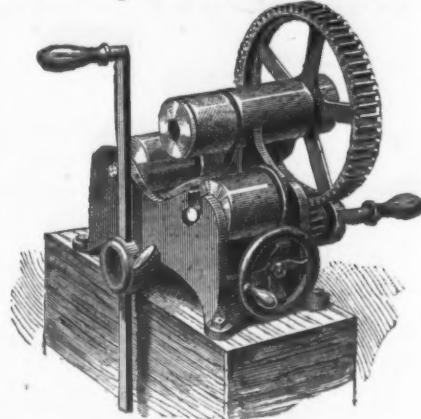
No. 2 will heat to a welding heat a 2 1/2 inch square bar in 12 minutes, and do any work up to 2 1/2 inches square iron equal to any forge of larger size.

Send for Circulars and Price List.

WILEY & RUSSELL MANUFACTURING CO., Greenfield, Mass.,
Lightning Screw-Cutting Machinery and Tools.Lightning Screw Plates and Bolt Cutters.
Green River Drilling Machines.
Green River Tire Headers.
Green River Tire Upsetters.

Special Screw Plates for the use of Model Makers, Carriage Makers, Blacksmiths and others. Taps, Dies and Reamers for use with the Bit Braces. Tire Bolt Wrenches, Nut Wrench, Screw Plates for threading gas pipe.
Send for Illustrated Price Lists and Circular.

Agents in London, England, Messrs. Selig, Sonenthal & Co.



Important to Railway Companies, Cities and Mine Owners.

BLAKE'S
CHALLENGE ROCK BREAKER

Sectional Cushioned Crusher,

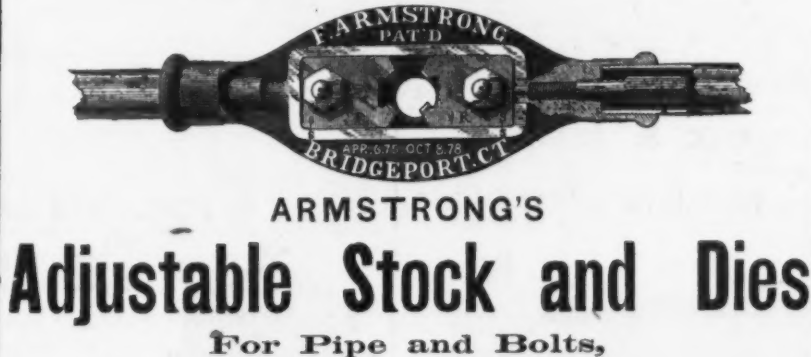
Patented Nov. 18, 1879.

Will be found the most economical and reliable crusher ever offered to the public for crushing

RAILWAY BALLAST, ROAD METAL,
STONE FOR CONCRETE, QUARTZ,
FLINT, EMERY, CORUNDUM,
FELDSPAR, BARYTA,
MANGANESE, PLASTER,
SOAPSTONE, &c., &c.

This machine dispenses with cast iron frame and pitman of our old forms. All strains are on wrought iron or steel.
Over 50 Medals, including Paris Gold and Silver Medals.

ADDRESS
BLAKE CRUSHER CO., Sole Makers,
New Haven, Conn.

ARMSTRONG'S
Adjustable Stock and Dies

For Pipe and Bolts,

Have the following advantages:

1st.—The Armstrong Improved Dies can be adjusted to the variations in the size of fittings.

2d.—The Armstrong Dies, by reason of their peculiar cutting edge, can be worked with much less labor, and accomplish the desired results in less time, than with the solid Die.

3d.—The Armstrong Dies have a double taper, that is, the taper at the entrance for the first few threads is greater in degree than the standard taper, which forms a lead to the Dies, causing them to start on the pipe without fling, even when there is a swell or burr, and requiring no pressure whatever to start the Dies on the pipe.

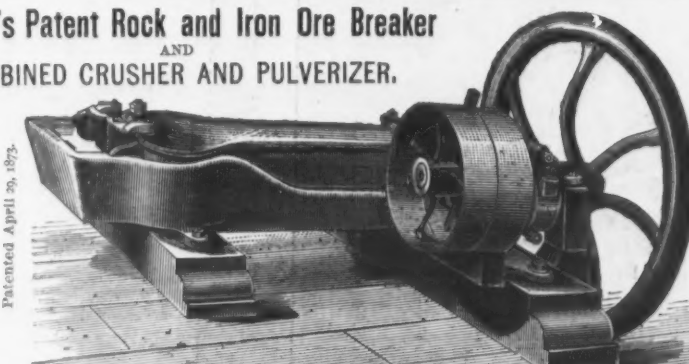
4th.—The Armstrong Dies being made in two parts instead of one (as in the solid Die), can be more perfectly constructed; the cutting edges reached more directly; the work done with greater precision and uniformity, by which they accomplish a much better result.

5th.—The Armstrong Dies can be sharpened without drawing the temper, and can be kept in good condition easier and with less expense than any other Dies ever offered to the public. A mechanic can sharpen these Dies, and is not obliged to send them to the manufacturer, as is the case with solid Dies when they become dull.

6th.—The Armstrong Dies are interchangeable in the stock, and although adjustable, do not need adjusting to cut the standard size for which the dies are made. The adjusting is only done when the irregularity or variations in the fittings make it necessary. There are corresponding marks (S) on the Stock and on the Dies (D) and when these marks are brought into line the Dies will cut the standard size.

For sale by leading dealers in Hardware and Steam and Gas Fitters' Tools. For further particulars address,

F. ARMSTRONG, Bridgeport, Conn.

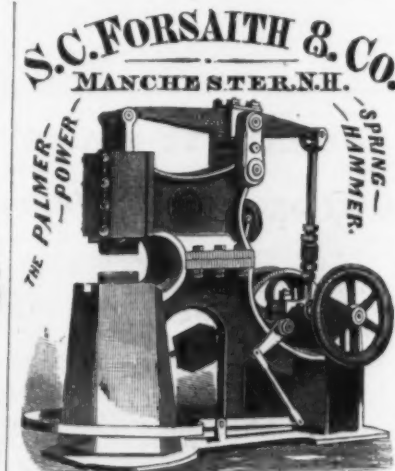
Forster's Patent Rock and Iron Ore Breaker
AND
COMBINED CRUSHER AND PULVERIZER.

The Blake Crusher Patent has expired. After six years of practical and constant use at the Etta Iron and Nail Works, Bridgeport, Ohio, to which Company all desiring information are respectfully referred, the Forster Crusher has demonstrated its superiority. It requires but one-third the power to run it. It requires less than one-half the expense to keep it in repair. It is the simplest machine ever made to accomplish the same amount of work. The saving in steam to run it, and the saving in expense of keeping in repair will pay for it in one year, besides saving all the annoyance and expense of delays. It will break rocks or iron ore to any required size, and can be so adjusted as to pulverize to any required fineness. Its capacity with three inch belt is thirty tons iron ore in ten hours. Larger machines in proportion. Every machine guaranteed as to efficiency, material and workmanship. We furnish of any required size—large or small. Its lightness and efficiency make it very desirable for gold and silver mining, all the parts being easily transported. We annex the testimony of a well known and thoroughly practical rolling mill manager:

MEERS, TOTTEN & CO.—DEAR SIR: I have been operating constantly in connection with our works for nearly six years, one of Forster's Crushers, manufactured by you, for crushing ore, used in our puddling furnaces. I have a thorough practical acquaintance with the Crusher in general use, and have no hesitation in saying that the Forster Crusher will crush ore with one-third the power of the Blake Crusher, and with one-half the expense of keeping in repair. The dies can be so adjusted as to pulverize. I take pleasure in saying, after using it six years, that it is the simplest, most economical and most efficient Crusher I ever saw.

LEWIS JONES, Manager Etta Iron and Nail Co.
All communications addressed to us will receive prompt attention.

TOTTEN & CO., Rolling Mill and Heavy Machinery Founders, Pittsburgh, Pa.

The Palmer Patent
POWER HAMMER,

For General Forging up to 6 inches.

Nine Sizes Built,
SIMPLE, POWERFUL, EFFICIENT, CHEAP.

Don't buy a Hammer until you send to us for our reduced price list with cuts and description. Address sole manufacturers,

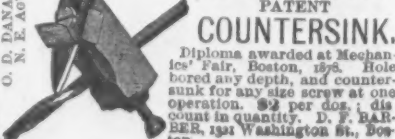
S. C. FORSAITH & CO.,

Manchester, N. H.,
who are also builders of the
ABBE BOLT HEADING MACHINES.

PORTABLE & STATIONARY
ENGINES AND BOILERS,

2 1/2 to 15 H. P.
Return Flue Boiler, large Fire Box, no sparks.
Do not fail to send for circular to

SKINNER & WOOD, Erie, Pa.



BARBER'S
PATENT
COUNTERSINK.
Diploma awarded at Mechanics' Fair, Boston, 1878. Hole bored any depth, and countersunk for any size screw at one operation. \$2 per doz.; discount in quantity. D. F. BARBER, 1341 Washington St., Boston.

The Iron Age Directory and Index to Advertisements.

ALPHABETICALLY BY PAGE

Agricultural Implements.	Page
Brant Farm Mill and Cradle Co., Melrose, N. Y.	1
Hooper Drill Co., Richmond, Ind.	2
Wheeler & Melick Co., Albany, N. Y.	3
Air Compressors.	
Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y.	4
The Norwalk Iron Works Co., S. Norwalk, Conn.	4
Alarm Money Drawers.	
Tucker & Dorsey, Indianapolis, Ind.	5
Anti-Friction Metals.	
Rever & Sons, Philadelphia, Pa.	6
Architectural Iron Work.	
Edna Iron Co., 25 Goreck, N. Y.	7
Chamberlain & Co., Cleveland, O.	8
Asbestos Materials.	
The Chalmers-Spence Co., Foot 6th st., E. R., N. Y.	9
Axles, Hubs, etc., Manufacturers of.	
Jennings C. E. & Co., 38 Chambers, N. Y.	10
Axles, Springs, &c., Manufacturers of.	
Cook & Co., 111 Broadway, N. Y.	11
Hotchkiss Guy C., Field & Co., 62 E. 14th, N. Y.	12
Lambertville Iron Works, Lambertville, N. J.	13
Shelton & Co., 25 Chambers, N. Y.	14
Babbit Metal.	
Philadelphia Smelting Co., 12th and Noble, Phila.	15
Bag Holder.	
Sorensen L. Jeff., Ashland, Ohio.	16
Barb Wire.	
Scott H. B. & Co., Buffalo, N. Y.	17
Bed Screws.	
Shelton & Co., Birmingham, Ct.	18
Bellevue, Manufacturers of.	
Scott Geo. H., Chicago, Ill.	19
Bells (Steel).	
Bevin Bros. & Co., Easthampton, Conn.	20
Belting, Makers of.	
Alexander Bros., 412 N. 3d, Philadelphia.	21
Foranburgh Wm. J., 17 E. 10th, Philadelphia.	22
N. Y. Beltine and Packing Co., 37 Park Row, N. Y.	23
Peck & Bemis, Cleveland, O.	24
Bicycles.	
Pope Mfg. Co., 65 Summer, Boston.	25
Bird Cages, Makers of.	
Jewett John C., 101 Buffalo, N. Y.	26
Lindeman O. & Co., 251 Pearl, N. Y.	27
Maxheimer John, 247 and 249 Pearl, N. Y.	28
Bit Braces.	
Pratt & Pizer, Bridgeport, Conn.	29
Miller & Sons, 74 Chambers, N. Y.	30
Black, Truck, Makers, etc.	
Burr & Co., 31 Peck Slip, N. Y.	31
McMillan Wm. H. & Bro., 111 South, N. Y.	32
Penfield Block Works, Lockport, N. Y.	33
Providence Tool Co., Providence, R. I.	34
Blowers and Exhaust Fans.	
Sturtevant B. Boston.	35
Boiler Covers.	
The Chalmers-Spence Co., Foot 6th st., E. R., N. Y.	36
Boilers, Manufacturers of.	
Barber W. H. & Bro., Allentown, Pa.	37
Bolt Cutters.	
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	38
Wiley & Russell, Greenfield, Mass.	39
Bolt Forging Machines.	
Furness & Co., Manchester, N. H.	40
Bolts (Screw).	
Boleman Eagle Bolt Works, Philadelphia.	41
Brass, Manufacturers of.	
Ansonia Brass and Copper Co., 10 Cliff, N. Y.	42
Bridgeport Brass Co., Bridgeport, Conn.	43
Brass Goods Mfg. Co., 43 Chambers, N. Y.	44
Brown & Bros., 38 Chambers, N. Y.	45
David John & Sons, 101 Chambers, N. Y.	46
Holmes, Booth & Co., 49 Chambers, N. Y.	47
Manhattan Brass Co., 1st Ave. and 27th st., N. Y.	48
Merchant & Atwood Mfg. Co., 38 Chambers, N. Y.	49
Rome Iron Works, Rome, N. Y.	50
Scott Mfg. Co., 417 Chambers, N. Y.	51
Waterbury Brass Co., 206 Broadway, N. Y.	52
Brass Foundries.	
Reeves Paul S., Philadelphia.	53
Brick Machines.	
Miller S. P. & Son, 305 5th, Phila.	54
Bridge Building.	
Crosby A. D. & Co., 101 Chambers, N. Y.	55
Buckets, Chain Pump.	
Woolley & Co., 101 Chambers, N. Y.	56
Butcher and Shoe Knives, Manufacturers of.	
Wilson John, Sheffield, England.	57
Butte and Iron.	
American Spiral Spring Co., 82 Beekman, N. Y.	58
New England Butte Co., 30 Platt, N. Y.	59
Gabin Mfg. Co., 101 Chambers, N. Y.	60
Stanley Works, New Britain, Conn.	61
Union Mfg. Co., 38 Chambers, N. Y.	62
Carriage Hardware.	
Shelton & Co., Birmingham, Ct.	63
Townsend, Wilson & Hubbard, Philadelphia.	64
Carriage Hardware.	
Cover E. & Co., 101 Chambers, N. Y.	65
Ives, Woodruff & Co., Mount Carmel, Conn.	66
Leroy, Shattuck & Co., 101 Chambers, N. Y.	67
Smith H. & Co., 101 Chambers, N. Y.	68
The E. D. Clapp Co., 101 Chambers, N. Y.	69
Wilcox & Howland, Birmingham, Conn.	70
Carriage Springs.	
Rever Spring Co., 101 Chambers, N. Y.	71
Car Ales.	
Roberts A. P. & Co., 205 S. 4th, Philadelphia.	72
Carriages.	
Hartley & Graham, New York.	73
Casters.	
Barber W. H. & Bro., Allentown, Pa.	74
St. Louis Malleable Iron Co., St. Louis, Mo.	75
Caulking Iron.	
Carver John, Monroe, N. Y.	76
Chains.	
Morton Thomas, 61 Elizabeth, N. Y.	77
Chains, Manufacturers of.	
Buck Bros., Millbury, Mass.	78
Chucks.	
Cushman A. F., Hartford, Conn.	79
The E. Horton & Son Co., Windsor Locks, Conn.	80
Clock Springs, etc.	
Cary & Moore, 101 Chambers, N. Y.	81
Dunbar Bros., Bristol, Conn.	82
Coal, Makers of.	
Pardee A. & Co., 111 Broadway, N. Y.	83
The Hoboken Coal Co., Jersey City, N. J.	84
Coffee and Spice Mills.	
Ans Brothers, Millbrook, N. Y.	85
Enterprise Mfg. Co., Philadelphia, Pa.	86
Coke.	
Winter Francis, 230 S. Third, Phila.	87
Compasses and Dividers, Manufacturers of.	
Bemis & Call, 101 Chambers, N. Y.	88
Copper.	
Merchant & Atwood, 101 Chambers, N. Y.	89
The New Haven Copper Co., 215 Pearl, N. Y.	90
Corn Huskers.	
Chambers, Berne & Quinlan, Decatur, Ill.	91
Corrugated Iron.	
Mosely Iron Bridge and Roof Co., 5 Day, N. Y.	92
Countersink.	
Barber D. E., 121 Washington, Boston.	93
Cranes.	
Wiley & Russell, 101 Chambers, N. Y.	94
Cupola.	
Smith & Byrre Mfg. Co., 31 Cortlandt, N. Y.	95
Cutlery, Importers of.	
Boeker Hermann & Co., 101 Duane, N. Y.	96
Claughton & F. W., 38 Chambers, N. Y.	97
Friedman & Lantier, 101 Chambers, N. Y.	98
Cutlery, Makers of.	
Burkshaw Aaron, Pepperell, Mass.	99
Henry Seymour Cutlery Co., 38 Chambers, N. Y.	100
Meriden Cutlery Co., 38 Chambers, N. Y.	101
Rogers Wm. & Son, Hartford, Conn.	102
The James & Goodnow Mfg. Co., 38 Chambers, N. Y.	103
Dampers.	
Wallace & Co., 101 Chambers, N. Y.	104
Dampers, Manufacturers of.	
American Steam Appliance Co., Boston, Mass.	105
Differential.	
Yale Lock Mfg. Co., 38 Chambers, N. Y.	106
Dinner Pail and Lanterns.	
Haight Jos., Peabody, N. Y.	107
Discount Tables.	
Jennings S. H., Deep River, Conn.	108
Door and Gate Springs.	
Dunne P. R., 101 Chambers, N. Y.	109
Van Wagoner & Williams, 38 Beekman, N. Y.	110
Door Hubs.	
Ives Robert B., New Haven, Ct.	111
Drilling Machine, Makers of.	
Bornton & Plummer, Worcester, Mass.	112
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	113
Thorne, De Haven & Co., Philadelphia.	114
Wiley & Russell Mfg. Co., Greenfield, Mass.	115
Drop Forgings.	
Ross Wm. & Bro., West Philadelphia, Pa.	116
Merrill C. & Son, 55 Grand, N. Y.	117
Drop Hammers.	
The Siles & Parker Press Co., Middletown, Ct.	118
Drop Presses.	
Becher & Pock, New Haven, Conn.	119
Edge Tools.	
Doehner M. & Co., 38 Chambers, N. Y.	120
Electric Machines.	
Weston Dynamo-Electric Machine Co., Newark, N. J.	121
Elevators, Makers of.	
Brandsford & Co., Pearl River, N. Y.	122
Elevators, Manufacturers of.	
Crane Bros. Mfg. Co., Chicago, Ill.	123
Stokes & Parrish, Philadelphia.	124
Elevator Buckets.	
Rosland T. F., Brooklyn, N. Y.	125
Emery and Emery.	
Allen Emery Co., Boston, Mass.	126
Ashland Emery Co., Perth Amboy, N. J.	127
Irville A. & Co., 101 Chambers, N. Y.	128
Lehigh Valley Emery Wheel Co., Weisport, Pa.	129
Engineers.	
Wolmer F. L., Lebanon, Pa.	130
Engines, Air.	
Sherrill Roper Air Engine Co., 91 Washington, N. Y.	131
Engines, Compound.	
Schleicher, Schumm & Co., Philadelphia.	132
Engines, Locomotive.	
Baldwin Locomotive Works, Philadelphia, Pa.	133
Engines, Steam, Makers of.	
Barber W. H. & Bro., Allentown, Pa.	134
Lane & Bodley Co., Cincinnati, O.	135

Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fraser, H. & Co., 45 John, N. Y.
Fr

NEW YORK WHOLESALE PRICES, MARCH 3, 1880.

METALS.

IRON.—Duty: Bars, 1 to 140. # 2. Sheet, Band and Hoop and Scroll, 14 to 140. # 2; provided, that none of the above iron shall pay a less rate of duty than 35 per cent. Pig, 87 # 2. Polished Sheet, 35 # 2. Wrought Scrap, 85 # 2. Cast Scrap, 85 # 2. Railroad 700 # 2. Boiler and Plate, 140. # 2.

Pig iron.—American Nominal.

Foundry No. 1. # 2. ton 34.00 @ 35.00

No. 2. # 2. ton 34.00 @ 35.00

Gray Forge. # 2. ton 34.00 @ 35.00

Eglington. # 2. ton 31.00 @ 32.00

Crutcher. # 2. ton 31.00 @ 32.00

Guernsey. # 2. ton 31.00 @ 32.00

Gartshore. # 2. ton 31.00 @ 32.00

Rolls.

Iron. (nominal). # 2. ton 34.00 @ 35.00

Steel. (nominal). # 2. ton 34.00 @ 35.00

Old Rails. # 2. ton 42.00 @ 43.00

Scrap.

Wrought Scrap, from yard. # 2. ton 45.00 @

Star Iron, from Store.

Common Iron: # 2. 10 to 12 in. round and square. # 2. 3.70

Refined Iron: # 2. 10 to 12 in. round and square. # 2. 4.00

10 to 12 in. round and square. # 2. 4.20

Rods—14 and 11 to round and square. # 2. 4.70

Bands—10 to 12 in. round and square. # 2. 4.70

Norway Nail Rods. # 2. 4.70

Sheet Iron.

Common. # 2. 10 to 12 in. round and square. # 2. 3.70

American. # 2. 10 to 12 in. round and square. # 2. 4.00

R. G. # 2. 10 to 12 in. round and square. # 2. 4.20

24 to 26. # 2. 4.40

27. # 2. 4.60

28. # 2. 4.80

Galvanized, 10 to 20. # 2. 11.50 @ 12.50

21 to 24. # 2. 12.50 @ 13.50

25 to 28. # 2. 13.50 @ 14.50

29. # 2. 14.50 @ 15.50

30. # 2. 15.50 @ 16.50

Patent Flashed. # 2. 10 to 12 in. round and square. # 2. 13.00

Russian. # 2. 10 to 12 in. round and square. # 2. 13.50

American Cold Rolled. # 2. 10 to 12 in. round and square. # 2. 14.00

COPPER.—Duty: Pig, Bar and Ingot, 100 # 2. Old Copper 40 # 2. Manufactured (including all articles of which Copper is a component of chief value), 45 # 2. American Ingot. # 2. See Trade Report.

Sheathing, Braziers' Copper, Bolts, &c.

Braziers' Copper, ordinary size, 100 # 2. per sq. ft. and over per lb. # 2. 3.40

Braziers' Copper, ordinary size, under 100 # 2. per sq. ft. and over 12 oz. # 2. 3.40

Braziers' Copper, 10 oz. and 12 oz. # 2. 3.40

Circles less than 8 in. diameter. # 2. 3.40

Circles 8 in. diameter and over. # 2. 3.40

Segment and Pattern Sheets. # 2. 3.40

10 oz. and 12 oz. # 2. 3.40

Sheathing Copper, over 12 oz. # 2. 3.40

Bolt Copper. # 2. 3.40

Copper Bottoms. # 2. 3.40

No Copper in Sheathing except 14 oz. and 16 oz. to exceed 14 oz. to the sq. ft.

BRASS.

Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' TRADE LIST.—Jan. 15, 1880.

Cash prices for Roll and Sheet Brass. For less than quantity than 100 # 2. add 35 # 2.

High Brass.

All Nos. not thinner than No. 28, wider than 3 in. not wider than 1 in. # 2. 3.20

All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive. # 2. 3.30

All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive. # 2. 3.40

30 in. inclusive. # 2. 3.50

30 # 2. advance on each No. above Nos. 28 to 30, inclusive. # 2. 3.60

All Brass thinner than No. 28 in Platers' Brass. # 2. 3.70

Sheets 24 in. and all sheets cut and all articles of brass and lengths under 30 in. in width wider than 3 in. # 2. 3.80

Printers' Rules. # 2. 3.90

Sheets wider than 30 in. and over 14 to 20 in. inclusive. # 2. 4.00

40 in. and over. # 2. 4.10

Circular Sheets, in diam. from 4 in. to 14 in. inclusive. # 2. 4.20

14 in. and over. # 2. 4.30

14 in. and over. # 2. 4.40

14 in. and over. # 2. 4.50

14 in. and over. # 2. 4.60

14 in. and over. # 2. 4.70

14 in. and over. # 2. 4.80

14 in. and over. # 2. 4.90

14 in. and over. # 2. 5.00

14 in. and over. # 2. 5.10

14 in. and over. # 2. 5.20

14 in. and over. # 2. 5.30

14 in. and over. # 2. 5.40

14 in. and over. # 2. 5.50

14 in. and over. # 2. 5.60

14 in. and over. # 2. 5.70

14 in. and over. # 2. 5.80

14 in. and over. # 2. 5.90

14 in. and over. # 2. 6.00

14 in. and over. # 2. 6.10

14 in. and over. # 2. 6.20

14 in. and over. # 2. 6.30

14 in. and over. # 2. 6.40

14 in. and over. # 2. 6.50

14 in. and over. # 2. 6.60

14 in. and over. # 2. 6.70

14 in. and over. # 2. 6.80

14 in. and over. # 2. 6.90

14 in. and over. # 2. 7.00

14 in. and over. # 2. 7.10

14 in. and over. # 2. 7.20

14 in. and over. # 2. 7.30

14 in. and over. # 2. 7.40

14 in. and over. # 2. 7.50

14 in. and over. # 2. 7.60

14 in. and over. # 2. 7.70

14 in. and over. # 2. 7.80

14 in. and over. # 2. 7.90

14 in. and over. # 2. 8.00

14 in. and over. # 2. 8.10

14 in. and over. # 2. 8.20

14 in. and over. # 2. 8.30

14 in. and over. # 2. 8.40

14 in. and over. # 2. 8.50

14 in. and over. # 2. 8.60

14 in. and over. # 2. 8.70

14 in. and over. # 2. 8.80

14 in. and over. # 2. 8.90

14 in. and over. # 2. 9.00

14 in. and over. # 2. 9.10

14 in. and over. # 2. 9.20

14 in. and over. # 2. 9.30

14 in. and over. # 2. 9.40

14 in. and over. # 2. 9.50

14 in. and over. # 2. 9.60

14 in. and over. # 2. 9.70

14 in. and over. # 2. 9.80

14 in. and over. # 2. 9.90

14 in. and over. # 2. 10.00

14 in. and over. # 2. 10.10

14 in. and over. # 2. 10.20

14 in. and over. # 2. 10.30

14 in. and over. # 2. 10.40

14 in. and over. # 2. 10.50

14 in. and over. # 2. 10.60

14 in. and over. # 2. 10.70

14 in. and over. # 2. 10.80

14 in. and over. # 2. 10.90

14 in. and over. # 2. 11.00

14 in. and over. # 2. 11.10

14 in. and over. # 2. 11.20

14 in. and over. # 2. 11.30

14 in. and over. # 2. 11.40

14 in. and over. # 2. 11.50

14 in. and over. # 2. 11.60

14 in. and over. # 2. 11.70

14 in. and over. # 2. 11.80

14 in. and over. # 2. 11.90

14 in. and over. # 2. 12.00

14 in. and over. # 2. 12.10

14 in. and over. # 2. 12.20

14 in. and over. # 2. 12.30

14 in. and over. # 2. 12.40

14 in. and over. # 2. 12.50

14 in. and over. # 2. 12.60

14 in. and over. # 2. 12.70

14 in. and over. # 2. 12.80

14 in. and over. # 2. 12.90

14 in. and over. # 2. 13.00

14 in. and over. # 2. 13.10

14 in. and over. # 2. 13.20

14 in. and over. # 2. 13.30

14 in. and over. # 2. 13.40

14 in. and over. # 2. 13.50

14 in. and over. # 2. 13.60

14 in. and over. # 2. 13.70

14 in. and over. # 2. 13.80

14 in. and over. # 2. 13.90

14 in. and over. # 2. 14.00

14 in. and over. # 2. 14.10

14 in. and over. # 2. 14.20

14 in. and over. # 2. 14.30

14 in. and over. # 2. 14.40

14 in. and over. # 2. 14.50

14 in. and over. # 2. 14.60

14 in. and over. # 2. 14.70

14 in. and over. # 2. 14.80

14 in. and over. # 2. 14.90

14 in. and over. # 2. 15.00

14 in. and over. # 2. 15.10

14 in. and over. # 2. 15.20

14 in. and over. # 2. 15.30

14 in. and over. # 2. 15.40

14 in. and over. # 2. 15.50

14 in. and over. # 2. 15.60

14 in. and over. # 2. 15.70

14 in. and over. # 2. 15.80

14 in. and over. # 2. 15.90

14 in. and over. # 2. 16.00

14 in. and over. # 2. 16.10

14 in. and over. # 2. 16.20

14 in. and over. # 2. 16.30

14 in. and over. # 2. 16.40

14 in. and over. # 2. 16.50

14 in. and over. # 2. 16.60

14 in. and over. # 2. 16.70

14 in. and over. # 2. 16.80

14 in. and over. # 2. 16.90

14 in. and over. # 2. 17.00

14 in. and over. # 2. 17.10

14 in. and over. # 2. 17.20

14 in. and over. # 2. 17.30

14 in. and over. # 2. 17.40

14 in. and over. # 2. 17.50

14 in. and over. # 2. 17.60

14 in. and over. # 2. 17.70

14 in. and over. # 2. 17.80

14 in. and over. # 2. 17.90

14 in. and over. # 2. 18.00

14 in. and over. # 2. 18.10

14 in. and over. # 2. 18.20

14 in. and over. # 2. 18.30

14 in. and over. # 2. 18.40

14 in. and over. # 2. 18.50

14 in. and over. # 2. 18.60

14 in. and over. # 2. 18.70

14 in. and over. # 2. 18.80

14 in. and over. # 2. 18.90

14 in. and over. # 2. 19.00

14 in. and over. # 2. 19.10

14 in. and over. # 2. 19.20

14 in. and over. # 2. 19.30

14 in. and over. # 2. 19.40

14 in. and over. # 2. 19.50

14 in. and over. # 2. 19.60

14 in. and over. # 2. 19.70

14 in. and over. # 2. 19.80

14 in. and over. # 2. 19.90

14 in. and over. # 2. 20.00

14 in. and over. # 2. 20.10

14 in. and over. # 2. 20.20

14 in. and over. # 2. 20.30

14 in. and over. # 2. 20.40

14 in. and over. # 2. 20.50

14 in. and over. # 2. 20.60

14 in. and over. # 2. 20.70

14 in. and over. # 2. 20.80

14 in. and over. # 2. 20.90

14 in. and over. # 2. 21.00

14 in. and over. # 2. 21.10

14 in. and over. # 2. 21.20

14 in. and over. # 2. 21.30

14 in. and over. # 2. 21.40

14 in. and over. # 2. 21.50

14 in. and over. # 2. 21.60

14 in. and over. # 2. 21.70

14 in. and over. # 2. 21.80

14 in. and over. # 2. 21.90

14 in. and over. # 2. 22.00

14 in. and over. # 2. 22.10

14 in. and over. # 2. 22.20

14 in. and over. # 2. 22.30

14 in. and over. # 2. 22.40

14 in. and over. # 2. 22.50

14 in. and over. # 2. 22.60

14 in. and over. # 2. 22.70

14 in. and over. # 2. 22.80

14 in. and over. # 2. 22.90

14 in. and over. # 2. 23.00

14 in. and over. # 2. 23.10

14 in. and over. # 2. 23.20

14 in. and over. # 2. 23.30

14 in. and over. # 2. 23.40

14 in. and over. # 2. 23.50

14 in. and over. # 2. 23.60

14 in. and over. # 2. 23.70

14 in. and over. # 2. 23.80

14 in. and over. # 2. 23.90

14 in. and over. # 2. 24.00

14 in. and over. # 2. 24.10

14 in. and over. # 2. 24.20

14 in. and over. # 2. 24.30

14 in. and over. # 2. 24.40

14 in. and over. # 2. 24.50

14 in. and over. # 2. 24.60

14 in. and over. # 2. 24.70

14 in. and over. # 2. 24.80

14 in. and over. # 2. 24.90

14 in. and over. # 2. 25.00

14 in. and over. # 2. 25.10

14 in. and over. # 2. 25.20

14 in. and over. # 2. 25.30

14 in. and over. # 2. 25.40

14 in. and over. # 2. 25.50

14 in. and over. # 2. 25.60

14 in. and over. # 2. 25.70

14 in. and over. # 2. 25.80

14 in. and over. # 2. 25.90

14 in. and over. # 2. 26.00

14 in. and over. # 2. 26.10

14 in. and over. # 2. 26.20

14 in. and over. # 2. 26.30

14 in. and over. # 2. 26.40

14 in. and over. # 2. 26.50

14 in. and over. # 2. 26.60

14 in. and over. # 2. 26.70

14 in. and over. # 2. 26.80

14 in. and over. # 2. 26.90

14 in. and over. # 2. 27.00

14 in. and over. # 2. 27.10

14 in. and over. # 2. 27.20

14 in. and over. # 2. 27.30

14 in. and over. # 2. 27.40

14 in. and over. # 2. 27.50

14 in. and over. # 2. 27.60

14 in. and over. # 2. 27.70

14 in. and over. # 2. 27.80

14 in. and over. # 2. 27.90

14 in. and over. # 2. 28.00

14 in. and over. # 2. 28.10

14 in. and over. # 2. 28.20

14 in. and over. # 2. 28.30

14 in. and over. # 2. 28.40

14 in. and over. # 2. 28.50

14 in. and over. # 2. 28.60

14 in. and over. # 2. 28.70

14 in. and over. # 2. 28.80

14 in. and over. # 2. 28.90

14 in. and over. # 2. 29.00

14 in. and over. # 2. 29.10

14 in. and over. # 2. 29.20

14 in. and over. # 2. 29.30

14 in. and over. # 2. 29.40

14 in. and over. # 2. 29.50

14 in. and over. # 2. 29.60

14 in. and over. # 2. 29.70

14 in. and over. # 2. 29.80

14 in. and over. # 2. 29.90

14 in. and over. # 2. 30.00

14 in. and over. # 2. 30.10

14 in. and over. # 2. 30.20

14 in. and over. # 2. 30.30

14 in. and over. # 2. 30.40

14 in. and over. # 2. 30.50

14 in. and over. # 2. 30.60

14 in. and over. # 2. 30.70

14 in. and over. # 2. 30.80

14 in. and over. # 2. 30.90

14 in. and over. # 2. 31.00

14 in. and over. # 2. 31.10

14 in. and over. # 2. 31.20

14 in. and over. # 2. 31.30

14 in. and over. # 2. 31.40

14 in. and over. # 2. 31.50

14 in. and over. # 2. 31.60

14 in. and over. # 2. 31.70

14 in. and over. # 2. 31.80

14 in. and over. # 2. 31.90

14 in. and over. # 2. 32.00

14 in. and over. # 2. 32.10

14 in. and over. # 2. 32.20

14 in. and over. # 2. 32.30

14 in. and over. # 2. 32.40

14 in. and over. # 2. 32.50

14 in. and over. # 2. 32.60

14 in. and over. # 2. 32.70

14 in. and over. # 2. 32.80

14 in. and over. # 2. 32.90

14 in. and over. # 2. 33.00

14 in. and over. # 2. 33.10

14 in. and over. # 2. 33.20

14 in. and over. # 2. 33.30

14 in. and over. # 2. 33.40

14 in. and over. # 2. 33.50

14 in. and over. # 2. 33.60

14 in. and over. # 2. 33.70

14 in. and over. # 2. 33.80

14 in. and over. # 2. 33.90

14 in. and over. # 2. 34.00

14 in. and over. # 2. 34.10

14 in. and over. # 2. 34.20

14 in. and over. # 2. 34.30

14 in. and over. # 2. 34.40

14 in. and over. # 2. 34.50

14 in. and over. # 2. 34.60

14 in. and over. # 2. 34.70

14 in. and over. # 2. 34.80

14 in. and over. # 2. 34.90

14 in. and over. # 2. 35.00

14 in. and over. # 2. 35.10

14 in. and over. # 2. 35.20

14 in. and over. # 2. 35.30

14 in. and over. # 2. 35.40

14 in. and over. # 2. 35.50

14 in. and over. # 2. 35.60

14 in. and over. # 2. 35.70

14 in. and over. # 2. 35.80

14 in. and over. # 2. 35.90

14 in. and over. # 2. 36.00

14 in. and over. # 2. 36.10

14 in. and over. # 2. 36.20

14 in. and over. # 2. 36.30

14 in. and over. # 2. 36.40

14 in. and over. # 2. 36.50

14 in. and over. # 2. 36.60

14 in. and over. # 2. 36.70

14 in. and over. # 2. 36.80

14 in. and over. # 2. 36.90

14 in. and over. # 2. 37.00

14 in. and over. # 2. 37.10

14 in. and over. # 2. 37.20

14 in. and over. # 2. 37.30

14 in. and over. # 2. 37.40

14 in. and over. # 2. 37.50

14 in. and over. # 2. 37.60

14 in. and over. # 2. 37.70

14 in. and over. # 2. 37.80

14 in. and over. # 2. 37.90

14 in. and over. # 2. 38.00

14 in. and over. # 2. 38.10

14 in. and over. # 2. 38.20

14 in. and over. # 2. 38.30

14 in. and over. # 2. 38.40

14 in. and over. # 2. 38.50

14 in. and over. # 2. 38.60

14 in. and over. # 2. 38.70

14 in. and over. # 2. 38.80

14 in. and over. # 2. 38.90

14 in. and over. # 2. 39.00

14 in. and over. # 2. 39.10

14 in. and over. # 2. 39.20

14 in. and over. # 2. 39.30

14 in. and over. # 2. 39.40

14 in. and over. # 2. 39.50

14 in. and over. # 2. 39.60

14 in. and over. # 2. 39.70

14 in. and over. # 2. 39.80

14 in. and over. # 2. 39.90

14 in. and over. # 2. 40.00

14 in. and over. # 2. 40.10

14 in. and over. # 2. 40.20

14 in. and over. # 2. 40.30

14 in. and over. # 2. 40.40

14 in. and over. # 2. 40.50

14 in. and over. # 2. 40.60

14 in. and over. # 2. 40.70

14 in. and over. # 2. 40.80

14 in. and over. # 2. 40.90

14 in. and over. # 2. 41.00

14 in. and over. # 2. 41.10

14 in. and over. # 2. 41.20

14 in. and over. # 2. 41.30

14 in. and over. # 2. 41.40

14 in. and over. # 2. 41.50

14 in. and over. # 2. 41.60

14 in. and over. # 2. 41.70

14 in. and over. # 2. 41.80

14 in. and over. # 2. 41.90

14 in. and over. # 2. 42.00

14 in. and over. # 2. 42.10

14 in. and over. # 2. 42.20

14 in. and over. # 2. 42.30

14 in. and over. # 2. 42.40

14 in. and over. # 2. 42.50

14 in. and over. # 2. 42.60

14 in. and over. # 2. 42.70

14 in. and over. # 2. 42.80

14 in. and over. # 2. 42.90

14 in. and over. # 2. 43.00

14 in. and over. # 2. 43.10

14 in. and over. # 2. 43.20

14 in. and over. # 2. 43.30

14 in. and over. # 2. 43.40

14 in. and over. # 2. 43.50

14 in. and over. # 2. 43.60

14 in. and over. # 2. 43.70

14 in. and over. # 2. 43.80

14 in. and over. # 2. 43.90

14 in. and over. # 2. 44.00

14 in. and over. # 2. 44.10

14 in. and over. # 2. 44.20

14 in. and over. # 2. 44.30

14 in. and over. # 2. 44.40

14 in. and over. # 2. 44.50

14 in. and over. # 2. 44.60

14 in. and over. # 2. 44.70

14 in. and over. # 2. 44.80

14 in. and over. # 2. 44.90

14 in. and over. # 2. 45.00

14 in. and over. # 2. 45.10

14 in. and over. # 2. 45.20

14 in. and over. # 2. 45.30

14 in. and over. # 2. 45.40

14 in. and over. # 2. 45.50

14 in. and over. # 2. 45.60

14 in. and over. # 2. 45.70

14 in. and over. # 2. 45.80

14 in. and over. # 2. 45.90

14 in. and over. # 2. 46.00

14 in. and over. # 2. 46.10

14 in. and over. # 2. 46.20

14 in. and over. # 2. 46.30

14 in. and over. # 2. 46.40

14 in. and over. # 2. 46.50

14 in. and over. # 2. 46.60

14 in. and over. # 2. 46.70

14 in. and over. # 2. 46.80

14 in. and over. # 2. 46.90

14 in. and over. # 2. 47.00

14 in. and over. # 2. 47.10

14 in. and over. # 2. 47.20

14 in. and over. # 2. 47.30

14 in. and over. # 2. 47.40

14 in. and over. # 2. 47.50

14 in. and over. # 2. 47.60

14 in. and over. # 2. 47.70

14 in. and over. # 2. 47.80

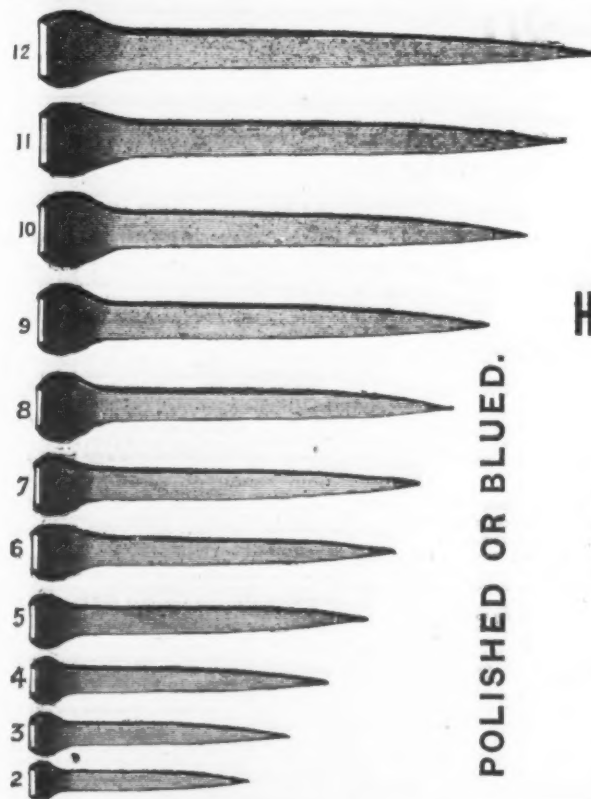
14 in. and over. # 2. 47.90

14 in. and over. # 2. 48.00

14 in. and over. # 2. 48.10

14 in. and over. # 2. 48.20

14 in. and over. # 2. 48.30</



POLISHED OR BLUED.

AUSABLE HORSE NAILS,

Twisted, Bent and Drawn COLD.

Hot Forged and Cold Hammered Pointed,

Are the only Nails in market that are made in imitation of the Hand Process. They have the uniformity of Machine Nails and the toughness of those hammered by hand. Our

HOT FORGED AND COLD HAMMERED POINTED NAILS

Are the Standard Nails,

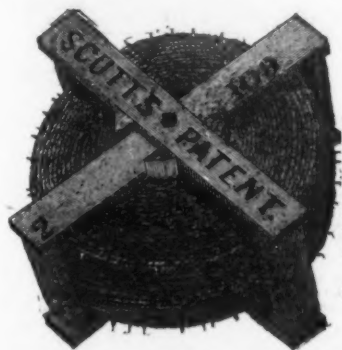
and are acknowledged to be the best in the market. They are used by the best shoers in New York, Brooklyn, Philadelphia, Chicago, Saint Louis, Milwaukee, Baltimore, &c., and

GENERALLY THROUGHOUT THE UNITED STATES.

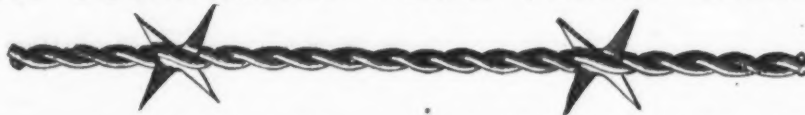
They also compete successfully in Foreign Countries with machine and hand-made Nails of their own manufacture.

AUSABLE HORSE NAIL CO.,

4 Warren St., New York.



SCUTT'S PATENT FOUR-POINTED STEEL BARBED CABLE FENCE WIRE.



The cable is formed in the same manner as the great cables used in bridges, and has a tensile strength double that of any twisted wire. It is the only barbed wire so manufactured. Both wire and barb material are manufactured especially for our use from the finest grade of Siemens-Martin steel. Our wire offers double the protection afforded by any two-pointed barb, each rod giving 128 points, while two-pointed barbs give but 64. It is the most attractive in appearance, and the best selling wire in the market, and, by actual tests, the strongest, lightest and consequently the cheapest. We manufacture under license from the Washburn & Moen Mfg. Co., and all danger of law suits is avoided in the purchase of our goods. We manufacture both painted and galvanized. The only Solid Steel Four-pointed Barb. Send for circulars and price list.

H. B. SCUTT & CO., Buffalo, N. Y.

PATENTED JANUARY, 1868, and DECEMBER, 1874.



MANUFACTURED ONLY BY

E. & J. C. COVERT,

Farmer Village,
NEW YORK, U. S. A.

Are the only manufacturers of an Adjustable Neck-Yoke Leather, of which a full description is given in our Illustrated Catalogue. Send for one.

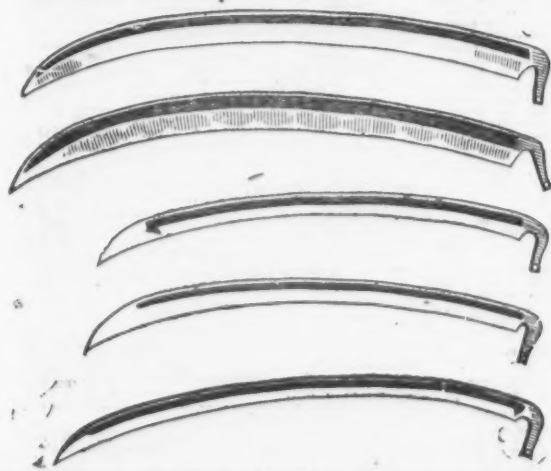
The Most Extensive Manufactory
OF
Neck-Yoke Leathers
AND
Trimmed Neck-Yokes
In the World.

Are kept in stock by nearly every Jobber in Carriage Goods in the U. S., and sold at Manufacturer's Prices, and at a saving in freights.



BEARDSLEY SCYTHE COMPANY, West Winsted, Conn.

Manufacturers of the well-known brands of



German Steel, Cast Steel and Silver Steel Grass Scythes.

ALSO THE
Clipper, Emperor, Beardsley's Golden Trimmer, Conqueror, Dutchman, Waldron, &c.

ALSO
Silver Steel, Clipper & Harvest Victor Grain Scythes, Common Pattern & Spear Point Hay Knives.

ALSO
Corn Knives, Bush & Weed Scythes.



A. B. GUNNISON,
MANUFACTURER OF
WOOD PUMPS
ERIE, PA.
ESTABLISHED, - 1856.
Warranted Genuine
Cucumber Pumps & Pipe. Also Poplar Pumps, Lined Pumps, &c.
The Trade Supplied by
H. B. GRIFFIN,
60 Cortlandt St., N. Y.
P. MANN, Washington, D. C.
KIRK & DICKSON
New Castle, Pa.
KNECHT & THOMAS,
Winchester, Ind.
—AND BY—
A. B. GUNNISON
Manufacturer,
ERIE, PA.

CLEM & MORSE,
Manufacturers and
dealers in
**Steam & Hand-
Power
HOISTING MA-
CHINES,**
Dumb Waiters, Base-
ment and Invalid
Elevators,
No. 414 Cherry St.,
PHILADELPHIA, PA.
New York Office,
108 Liberty Street.
All kinds of Hoisting
Machines repaired.
Estimates furnished on
application.

**THE UNIVERSAL
LIFTING JACK,**
For lifting carriages,
wagons, heavy loaded
teams, fire engines, railway
cars, &c. Four sizes, with
patent rubber cushions;
will not mar the finest
painted carriage.
DINSMORE MFG. CO.,
235 Washington St.,
BOSTON.
Silver medal awarded by
Massachusetts Mechanic
Charitable Association.
FOR SALE BY
SARGENT & CO., 37 Chambers St., New York.
MACOMBER, BIGELOW & DOUSE, 156 Oliver St.,
Boston.

GEORGE W. BRUCE,
1 Platt St., New York,

Agent for CLEMENT & MAYNARD'S Trowels, Hoes,
Shovels, Spades and Scoops. Their Trowels and Hoes
have entirely supplanted the English by their quality
and cheapness, while all their goods compare advan-
tageously with those of other makers, and are largely
exported.

**PRESSED STEEL
GEARING.**
Most powerful, accurate, durable and
cheapest. Any shaped teeth.
J. COMLY, Patentee,
LINCOLN PARK, N. J.

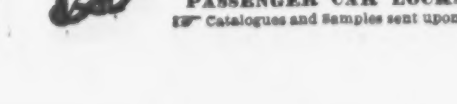
Philadelphia "STAR" Bolt Works.
NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
TOWNSEND, WILSON & HUBBARD, 2301 Cherry St. Philadelphia, Pa

ACME STEAM PUMPS
FOR EVERY DUTY.
VALLEY MACHINE CO.,
EASTHAMPTON, MASS.

[illegible]

[illegible]

Address P. O. Box 4462,



BROOKLYN, N. Y.

Pat. Mineral Wool.
A. D. ELBERS, 26½ B'way, N. Y.
Address P. O. Box 4462.

PATENT HORIZONTAL RIM CYLINDER NIGHT LATCH.
Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob
RIGHT OR LEFT HAND.

PASSENGER CAR LOCKS, Bronzed, Nickel-Plated and Japanned.
Catalogues and Samples sent upon application. **BROOKLYN, N. Y.**

Steel.

WOLFF, KAHN & CO.,

SUCCESSORS TO

R. H. WOLFF & CO.,

MANUFACTURERS, IMPORTERS, EXPORTERS & GENERAL MERCHANTS

MANUFACTURERS OF

CAST STEEL WIRE for all Purposes, Special Wire,
Market Steel Wire, Prime Coppered
Spring Wire, and of all Kinds of
Furniture Springs, &c.

IMPORTERS OF

IRON & STEEL, WIRE RODS,
GUN BARRELS, MOULDS & ORDNANCE.

EXPORTERS AND GENERAL MERCHANTS.

Direct all communications to

Works, Peekskill, N. Y.

Office and Warehouse, 46 Cliff St., New York.

MILLER, METCALF & PARKIN,
Pittsburgh, Pa.,
Manufacturers of

CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.

Polished, Compressed Drill Rods and Wire,

Warranted equal to any imported in quality, finish and accuracy.

Also Common Grades.

Established 1810.

J. & RILEY CARR,
SHEFFIELD, ENGLAND.

Manufacturers of the "Celebrated

"DOG BRAND" FILES.

Also of Superior

STEEL

For Drills, Cold Chisels, Tools, Taps, Dies, &c.

COLD ROLLED STEEL for Clock Springs, Corsets, &c.

SHEET CAST STEEL for Springs, Saws, Welding and Stamping Cold, &c.

GERMAN, MACHINERY, ENGLISH AND SWEDISH SPRING STEEL,

And all other descriptions for machinists and agricultural purposes.

Warehouse, 30 Gold Street, New York.

Near John Street.



HENRY MOORE, Agent.

S. & C. WARDLOW,
Sheffield, England,
Manufacturers of the Celebrated

Cast and Double Shear STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives,
Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.
Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

Cleveland Rolling Mill Co.,
Manufacturers of

BESSEMER STEEL

AND

Iron Rail and Fastenings,

SPRING STEEL

AND

WIRE OF ALL KINDS,

Steel Horse Shoes, Tire, Axles and other Forgings,

Roller Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and
Siding of Siemens-Martin, Bessemer Steel and Iron.
CLEVELAND, OHIO.

H. CHISHOLM, President.
E. S. PAGE, Secretary.

WM. CHISHOLM, Vice President.
W. B. CHISHOLM, Gen. Manager.

GEO. SANDERSON & CO.,

MANUFACTURERS AND

Importers of STEEL,

Removed to 30 Gold Street, New York.

Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS,
TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for
CLOCK SPRINGS, CORSET CLASPS, &c.

A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

Steel.

NEWARK STEEL WORKS.

BENJAMIN ATHA & CO.,

Manufacturers of

BEST REFINED CAST STEEL

And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.

Warranted most superior for TOOLS AND GRANITE ROCK DRILLS.

A full assortment of this universally approved OLD BRAND and other Steels for sale by

EDWARD FRITH & SON, Agents,

No. 241 Pearl St., New York.

LABELLE STEEL WORKS.

SMITH, SUTTON & CO.,

MANUFACTURERS OF ALL KINDS OF

STEEL.

Also Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

Represented at Boston by WYTHELL BROS., 21 Oliver St.; at Milwaukee JOHN FRITZLAFF, 43 to 49 West

Water St.; at Chicago by S. D. KIMBARK, 86 to 84 Michigan Ave.

ALBANY & RENSSLAER IRON & STEEL CO.,
Troy, N. Y.,
Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

Bessemer Railway Steel,

MERCHANT BARS, TIRE AND SHAFITING.

Railroad Iron, Pig Iron, Merchant and Ship Iron,

AGENCIES IN BOSTON AND PHILADELPHIA.

FRANCIS HOBSON & SON,
97 John Street, NEW YORK,

Sole Manufact'rs of **"CHOICE"** Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS. HUGILL, Agent.

COCKER BROTHERS,

(LIMITED)

Successors to SAM'L COCKER & SON,

ESTABLISHED 1752,

SOLE MANUFACTURERS OF THE

EXTRA**CAST STEEL of Every Description.**

WIRE in rings and lengths for every purpose.

WIRE PLATES from our PATENT METEOR STEEL.

SHEETS of any gauge and quality.

The public are requested to see that our registered Labels and Trade Mark are on all goods to insure their being genuine.

We maintain that, considering the high class quality of our goods, they are the cheapest in the market; therefore, Importers should apply direct to insure our best terms.

NAVIGATION STEEL WORKS

AND

NURSERY WIRE & ROLLING MILLS,

SHEFFIELD, ENGLAND.

FOREST CITY STEEL CO.,

Manufacturers of Best Quality

Crucible Steel for Drills, Taps, Dies, Tools, Mill Picks, &c.

Testimonial of D. J. Jones, Roll Turner, Cleveland Rolling Mill Co.

"I have been testing the steel on chilled iron rolls along with the best English and American steels, and find it superior to any of them in every respect."

Samples furnished for trial. Quality guaranteed equal to any.

No. 13 Detroit Street, Cleveland, Ohio.

STEEL Gautier Steel.

See Page 3.

Steel.

R. MUSHET'S
Special Steel

FOR

LATHES, PLANERS, &c.

Turns out at least double work by increased speed and less wear, and cuts harder metals than any other Steel. Neither hardening nor tempering required.

Sole Makers,

SAMUEL OSBORN & CO.,

Sheffield, England.

Represented in the United States by

RANDALL & JONES,

10 Oliver Street, BOSTON.

STEELINE.

Used for refining and tempering all kinds of Steel Tools. Increases their durability at least fivefold. Secures absolute safety from cracking.

Send for circular to

BAUER & CO.,

96 Greenwich Ave., N. Y.

Emery, Grindstones, &c.

Walter R. Wood,
GRINDSTONES.

Berea, O., Nova Scotia, & other brands

283 and 285 Front Street, New York.

WORTHINGTON & SONS,

North Amherst, Ohio.

Manufacturers of

Lake Huron Amherst
and Berea

GRINDSTONES.**H. S. WOOD & CO.,**

Manufacturers of

Berea, O., Nova Scotia, & other brands

GRINDSTONES

33 West & 58 Washington Sts., N. Y.

BOYD & CHASE,
OIL STONE

The largest manufacturers in the world of

Of all descriptions.

107th Street and Harlem River,

Send for Illustrated Price List. NEW YORK.

ASHLAND EMERY CO.

CHARLES ALDEN, MANAGER.

Importers and Manufacturers of PURE

TURKISH EMERY

A. A. IRVINE & CO., Agents,

14 MURRAY ST., NEW YORK.

Send for quotations and samples.

HYDRAULIC JACKS AND PUNCHES,

FOR

Raising Heavy Weights,

Punching Iron, &c.

HYDRAULIC PRESSES

On hand and made to order.

Second-hand Hydraulic Presses

bought and sold.

Machinery for Polishing and

Buffing Metals. Send for Circular.

E. LYON & CO.,

470 Grand Street,

NEW YORK.

PENNOCK'S**Patent Iron-Bender**

Is one of the most valuable labor-saving tools that

has ever been adopted by Car Builders or

Machinists. They are used by many of the largest

Railroad Companies and Car Builders in the

country. Send for circular.

PENNOCK MFG. CO., Kennett Square, Pa.

TRADE-MARK—Infringements dealt with according to law.

ESTABLISHED 1835

BENIS & CALL

ALL KINDS OF STEEL

AND IRON WORKS

107th Street and Harlem River,

NEW YORK.

Steel.

THE EDGAR THOMSON STEEL CO., LIMITED.

MANUFACTURERS OF



General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.

New York Office, 57 Broadway.

The Company warrants its rails equal in quality to any manufactured in the United States.

Branch Office and P. O. Address, No. 48 Fifth Ave., Pittsburgh, Pa.

THOS. M. CARNEGIE,
Chairman.D. A. STEWART,
Sec'y and Treas.

North Chicago Rolling Mill Co.

ESTABLISHED 1857.

CAPITAL, \$3,000,000.

INCORPORATED 1869.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL,
IRON RAILS & BESSEMER STEEL RAILS.

Fish Plates.....	20,000 tons.
Merchant Bar.....	40,000 "
Pig Metal.....	50,000 "
Iron Rails.....	50,000 "
Steel Rails.....	50,000 "
Total Capacity per year.....	210,000 "

OFFICES:

17 Metropolitan Block, Chicago, Ill.
37 Mitchell Block, Milwaukee, Wis.O. W. POTTER, President, CHICAGO.
S. F. BURK, Vice-President, NEW BEDFORD.
S. CLEMENT, Treasurer, MILWAUKEE.
R. C. HANNAH, Secretary, CHICAGO.

THE

STEEL COMPANY OF SCOTLAND, LIMITED,

(SIEMENS' PROCESS.)

MANUFACTURERS OF

Steel Rails, Steel Ship Plates,
Steel Blooms for Rails, Steel Boiler Plates,
Steel Blooms for Wire, Steel Angles,
Steel Wire Rods, Steel Forgings,
Steel Locomotive Fire Boxes, Steel Castings.

JAMES LEE & CO.,

Resident Agents for the United States,

72 Pine Street, New York.

PYROLUSITE MANGANESE COMPANY,

MINERS, DEALERS AND EXPORTERS OF HIGH TEST

Crystallized Black Oxide of

Manganese

IN CRUDE STATE.

Suitable for the manufacture of Ferro-Manganese, Spiegeleisen, Bessemer Pig, &c. Also, fine ground and granulated, especially prepared for

STEEL, GLASS, PAINT, VARNISH and DRYER MAKERS, OIL BOILERS, &c.

MANUFACTURERS OF SUPERFINE FLOATED

Standard Barytes, Gritless Ochre, Borate of Manganese, &c.

Office, 54 Cliff Street, New York.

Philadelphia Smelting Co.,

S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.

GENUINE BABBITT,

Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.

DEOXIDIZED BRONZE,

Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.

PHILADELPHIA, October 4, 1879.
GENTLEMEN: After a trial of eighteen months of your "Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.
Very truly,
HENRY DISSTON & SONS.

PENFIELD BLOCK WORKS,

LOCKPORT, NEW YORK,

MANUFACTURERS OF ALL KINDS OF

TACKLE BLOCKS

FOR THE

HARDWARE & EXPORT TRADE.

ALSO,

Improved Pat. Iron Sheaves (steel rollers),

The Giant Car Pusher,

The West Patent Lock Faucet,

Carpenters' Mallets,

Ten Pins and Lig. Balls.

Send for Illustrated Catalogue and Price List, and mention this paper.



"THE BOSS" JACK-SCREW.

R. D. WYNN,

Windsor, Vt., U. S. A.,

Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lard and Wine Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say The Iron Age.)

Agents: Fugatey & Chapman, 8 Liberty St., New York.
Sam'l May & Co., 16, 18 & 20 Oliver St., Boston.

WIRE NAILS

French Points,

Window Shade Nails,

Upholstering, **WAGON NAILS**, Molding Nails

(Sample Cards sent on application.)

Electrotype,

Roofing Nails,

Barbed Caster Nails.

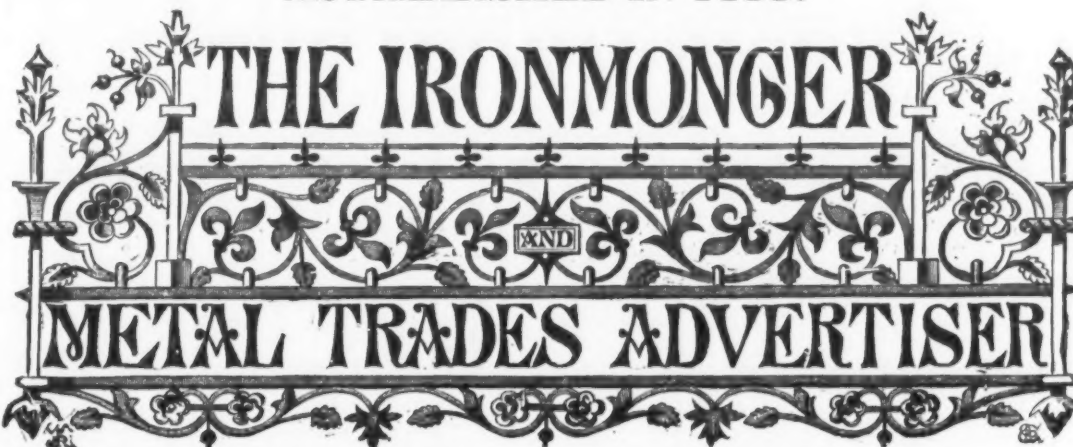
Veneer Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. packages, 1 lb. papers, or as wanted.

AMERICAN WIRE NAIL CO.

Factory, Fifteenth and Madison Sts.

COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

NEW YORK OFFICE: DAVID WILLIAMS, Publisher of The Iron Age, 83 Reade street.

PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS,
Manager and Associate Editor.
PHILADELPHIA OFFICE: 222 South Fourth Street—THOMAS
HOBSON, Manager.

CINCINNATI OFFICE: Builders' Exchange—T. T. MOORE,
Manager.
SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chatta-
nooga, Tenn.—S. B. LOWE, Manager.

The Next Half-Yearly SPECIAL ISSUE

OF

12,000 COPIES

Will Take Place on April 3, 1880,

when that large number of copies will be distributed among the principal makers of and dealers in Iron, Steel, Hardwares, Agricultural Implements, Domestic Contrivances, Labor-Saving Appliances, Tinware, Pewterers, &c., &c., in all parts of the world.

Particular attention will be given to the British Colonies, India, and the other great purchasing markets.

The names of the recipients will not be taken from directories, but from our own private manuscript Register, which has taken 21 years to compile, and is constantly and carefully revised to date.

ADVERTISEMENTS

are inserted in the Ironmonger and Metal Trades Advertiser at the subjoined rates, from which no variation can be made on any ground whatever

Size of Page—Nine Inches Deep by Six Inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the Ironmongers' Diary and Text Book, published toward the end of each year, and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	SPECIAL ISSUE ONLY.
One page.....	Gold. \$17.50	Gold. \$18.75	Gold. \$20.00	Gold. \$22.50	Gold. \$50.00
Two-thirds page.....	13.15	14.10	15.00	16.00	37.50
Half page.....	9.75	10.25	11.00	12.40	27.50
One-third page.....	7.00	7.50	8.00	9.00	20.00
Quarter page.....	5.60	6.00	6.30	7.25	16.00
One-sixth page.....	3.95	4.25	4.50	5.10	11.30
One-eighth page.....	3.15	3.40	3.60	4.10	9.00
One-sixteenth page.....	1.75	1.90	2.00	2.25	5.00

American Manufacturers who wish to secure a fair share of European, Colonial, &c., orders for their specialties should not fail to advertise in this issue.

In compliance with many requests, the proprietors will on this occasion receive Lists and Circulars, which will be firmly stitched in with and form part of the number. Each list or circular must have the words "Supplement to the Ironmonger, April 3, 1880," printed on the top of each page. Our charges for circulating 12,000 lists will be as follows:

Two Pages (Same size as Ironmonger),	\$37.50
Four Pages " " " "	50.00
Eight Pages " " " "	75.00

All copy, blocks, &c., must reach us not later than Tuesday, March 30, 1880.

B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.
Established 1845.
Office foot of Houston Street, East River,
NEW YORK.

NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

M. D. Valentine & Bro

Manufacturers of

FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.
Woodbridge, - - - N. J.

BORGNER & O'BRIEN,

Manufacturers

FIRE BRICK

Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
PHILADELPHIA.
Above Race,
Twenty years' practical Experience.

PERTH AMBOY TERRA COTTA CO.,

Successors to

A. HALL & SONS, Perth Amboy, N. J.,
ARCHITECTURAL TERRA COTTA

FIRE BRICK.
170 Broadway, NEW YORK.

Brooklyn Clay Retort

FIRE BRICK WORKS.

Manufacturers of Clay Retorts, Fire Brick, Gas
House and other Tile, Cupola Brick, &c. Dealers in
and Miners of Fire Clay and Fire Sand. Clay bank at
Burl's Creek, New Jersey. Manufacture: Van Dyke,
Elizabeth, Richards and Partition Sts., Brooklyn, N. Y.
Office: No. 25 Van Dyke St.

Watson Fire Brick Manufactory,

ESTABLISHED 1836.

JOHN R. WATSON, Perth Amboy, New Jersey.
Manufacturer of

FIRE BRICK,
For Rolling Mills, Blast Furnaces, Foundries,
Gas Works, Lime Kilns, Tanneries, Boiler
and Grate Setting, Glass Works, &c.
Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER, Excelsior Fire Brick & Clay Retort Works.

Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.
WORKS: PERTH AMBOY, NEW JERSEY.
Office & Depot, 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.,

JAMES OSTRANDER & SON,
ESTABLISHED 1846,
Manufacturers of

FIRE BRICK,
Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and
Dealers in Woodbridge Fire Clay and Sand, and Staten
Island Kaolin.

GARDNER BROTHERS,

Manufacturers of

**STANDARD SAVAGE FIRE BRICK,
TILE & FURNACE BLOCKS,**
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and
Miners and Shippers of Fire Clay.
Office: 116 Smithfield St., Pittsburgh, Pa.
Works: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS, FIRE BRICK,

Buffalo, N. Y.

MILLER'S BRICK PRESSES

(Established 1844).

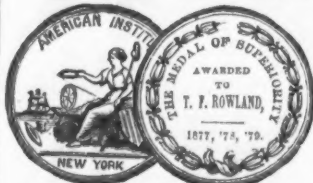
FIRE and RED BRICK,
And Brickmakers' Tools in General.
AML. P. MILLER & SON,
309 South 5th St., Philadelphia.

RUDOLPH FRANK, 229 FULTON STREET, New York.

FIRE BRICK.

Quotations given f.o.b.
Perth Amboy, Jersey City,
Hoboken, New York or Philadelphia.

DUK'S IMPROVED ELEVATOR BUCKET.



ALWAYS FIRST PREMIUM.
NO CORNERS TO CATCH.
THROWS FREE AND CLEAR.
200,000 IN USE.

Send for Circular.



3 1/2 in. to 10 in.



THE STOREHOUSE BUCKET.
(Partial straight front.)
In 12 in., 14 in., 16 in. and 17 in. Sizes.
Very Durable and Strong.

T. F. ROWLAND, Sole Manufacturer,
BROOKLYN, N. Y.

NICHOLSON FILE CO., Manufacturers of FILES AND RASPS.

ALSO

Filers' Tools & Specialties.

Manufactory and Offices at Providence, R. I.

The following space will be used in illustrating our specialties, the matter being changed weekly.

CAUTION!

We desire to call the attention of our friends and the public to a dangerous and most injurious means of deception, which we have found practiced at different times during the past few years.



We refer to old or worn-out files of our make, which have been treated by immersing them in an acid bath, and afterward selling them in packages bearing a label of similar appearance to ours, having the words "Nicholson" or "Nicholson Files," "Increment Cut," &c., printed thereon; thus palming the same off as our original goods.

As this fraud is of a most dangerous character, we advise caution against it—as files, so "doctored," are comparatively valueless for use.

We warn all parties that if detected in this, or any "doctoring" of our files, with the intention of trading upon our hard-earned reputation, they will be presented to the courts for treatment.

All original packages of First Quality Files leaving our works bear a Green Label, a copy of which is herewith attached, showing the largest of the three sizes used.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,

Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentiner Tools.

FOR SALE BY

MARTIN DOSCHER, Agent, 96 Chambers Street, N. Y.



Established 1838.
Bevin Bros. Mfg.
Co.,
Easthampton, Ct.
Manufacturers of
SLEIGH BELLS,
House, Tea, Hand,
Gong Bells, &c.
Bell Metal Kettles.

John T. Lewis & Bros
No. 231 South Front St.,
PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS

Brooklyn White Lead Co.



TRADE MARK

White Lead, Red Lead & Litharge.
89 Maiden Lane, NEW YORK.
FISHER HOWE, TREASURER.

JOHN JEWETT & SONS

Manufacturers of the well-known brand of

WHITE LEAD.



TRADE MARK.

ALSO MANUFACTURERS OF

LINSEED OIL.

152 Front Street, NEW YORK.



TRADE MARK.

The Atlantic White Lead
and Linseed Oil Co.,

MANUFACTURERS OF

White Lead (Atlantic), Red Lead,
Litharge & Linseed Oil.
ROBERT COLGATE & CO.,
257 Pearl Street, New York



Manufacturers of
Clock Springs and Small Springs
of every description, from best Cast Steel,
BRISTOL, CONN.

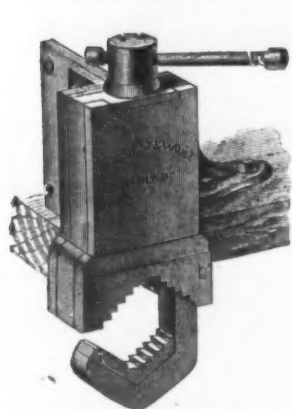
Torrey's Door Springs, P. R. DUNNE,

Manufacturer,

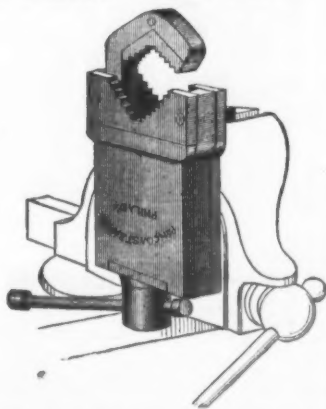


13 Stops, 3 set Reeds, Stool, Book,
only 48c. Pianos, Stool, Cover &
Book only 82c. Paper free.
D. F. BEATTY, Washington, N. J.

IMPROVED PIPE-FITTERS' VISE.



STRONG,
LIGHT,
EFFICIENT,
CHEAP.



To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work-bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTINGS BEING HELD SECURELY; the box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap, which can be readily carried about with kit of tools.

MANUFACTURED BY
PANCOAST & MAULE,
243 and 245 South Third Street, Philadelphia.

Wheeler, Madden & Clemson
MFG. CO.,
MIDDLETOWN, - - - NEW YORK.

Manufacturers of
WARRANTED CAST STEEL

SAWS

Of every description, including
Circular, Shingle, Cross-Cut, Mill, Hand,
WOOD SAWS, Etc., Etc.

AMERICAN SAW CO.,

Manufacturers of
Movable Toothed Circular Saws,
PERFORATED CROSS-CUT SAWS
And SOLID SAWS of all kinds. Trenton, N. J.

PATENT SCREW WINDOW BALANCE
FOR MEDIUM AND LIGHT WINDOWS.

A Mechanical Substitute for Sash
Weights.

Retains sashes at any point of opening, with large power in reserve, controlled by "Adjusting Screw." The fibered roller has unlimited durability. The patent "Clamp" prevents sagging. Cannot get out of order. THEY ARE TO WINDOWS WHAT DOOR KNOBS ARE TO DOORS, AND USERS SAY, A NECESSITY AND

"SURE OF GENERAL USE."

They are as readily applied as the common sash pulley, and have the merit of doing their work—rendering the use of boxed frames, cords, pulleys and the perplexing task of hanging sash with weights unnecessary. There is no cutting of, or attachment to, the sash; they work upon the edges of the sash only, and are not handled in working the sash. THE SASHES ARE BOTH LOCKED AND UNLOCKED BY A MEETING RAIL LOCK, as with weight, at one operation.

RETAIL PRICES.

12 to 18 lb. sashes, 4 balances.....\$1.00 per window.
12 lb. sashes and under, 2 balances.....50

COMPARATIVE COST WITH
WEIGHTS COMPLETE.

18 lb. sashes hung with weights.....\$2.50 per window.
18 lb. " " with 4 balances applied.....1.25

Balances, saving.....\$1.25

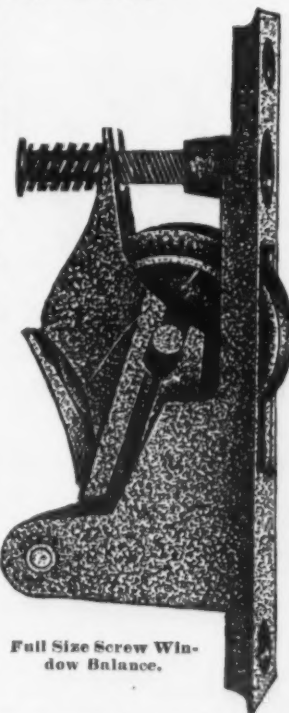
Sold in sets of 1 and 1/2 gross packages. Sample sets, 4 balances, sent upon application for \$1.00, postage free. Have been in use over one year, giving full satisfaction.

LIBERAL DISCOUNT TO THE TRADE.

Prompt attention is given communications and orders addressed to

As Applied, **ROBERT B. HUCUNIN,**

Manufacturer of Screw Balances,
Wethersfield, Conn.



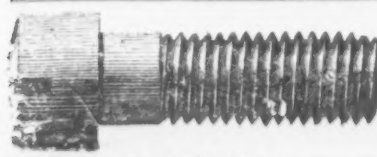
Full Size Screw Window Balance.

INFRINGEMENTS.—To whom it may concern:—As the inventor, patentee and sole authorized maker of the above goods under the mentioned U. S. Patents covering the combined inventions constituting the Screw Window Balance, and all other similar goods using these combined inventions being infringements of the said combined inventions, patented as before stated, all dealers, users, makers and handlers of such, are hereby notified that they will be held accountable, under the U. S. laws protecting inventions, for damages. Very respectfully,
WETHERSFIELD, CONN., April 25, 1879. **ROBERT B. HUCUNIN.**

CHUCKS.

MANUFACTURED BY
A. F. CUSHMAN,
Hartford, Conn., U. S. A.

Independent 4-Jawed Chucks, from 6 in. to 24 in. in diameter. Common Lever Scroll Chucks, from 3 in. to 24 in. Patent Geared Chucks, from 3 in. to 12 in. Common Geared, from 2 in. to 12 in. A large variety of Chucks for Amateurs' Foot Lathes. Drill Chucks for all kinds of machines and purposes. Patent Geared Chucks for Hollow Spindle Cutting-off Machines. Bench and portable Centering Chucks, and special chucks made to order. Satisfaction guaranteed. All of the above are from new patterns, with every improvement a long experience can suggest. Send for price list.



TURNED MACHINE SCREWS,
One-sixteenth to five-eighths diameter.
Heads and points to sample.
IRON, STEEL and BRASS.
JOHN FELLOWS,

Successor to LYON & FELLOWS, Factory and Office, 14 Dunham Place, Williamsburgh, N. Y.



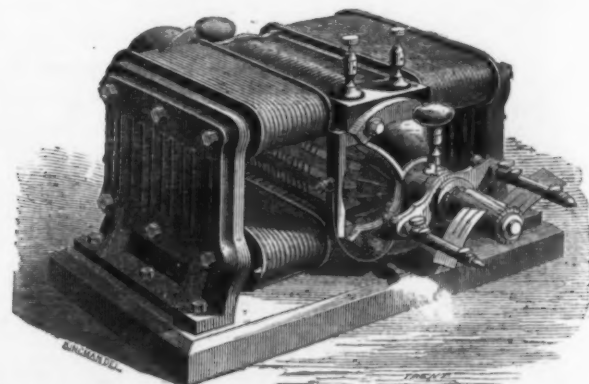
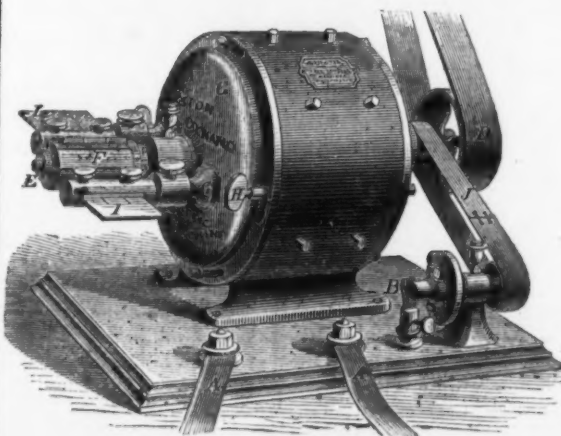
Manufacturers of GALVANIZED PUMP CHAIN FOR CHAIN PUMPS.

WESTON DYNAMO-ELECTRIC MACHINE CO.

286 Washington Street, Newark, N. J., U. S. A.,

MANUFACTURERS OF

**Machines for Electric Light, Electrotyping
and Electro-Plating.**



ARE MAKING

**THE MOST POWERFUL, SIMPLE AND COMPACT ELECTRIC LIGHT
MACHINE IN THE WORLD.**

By actual tests this machine has been found to yield more than double the amount of light per horse-power obtained from the best machines built in this country.

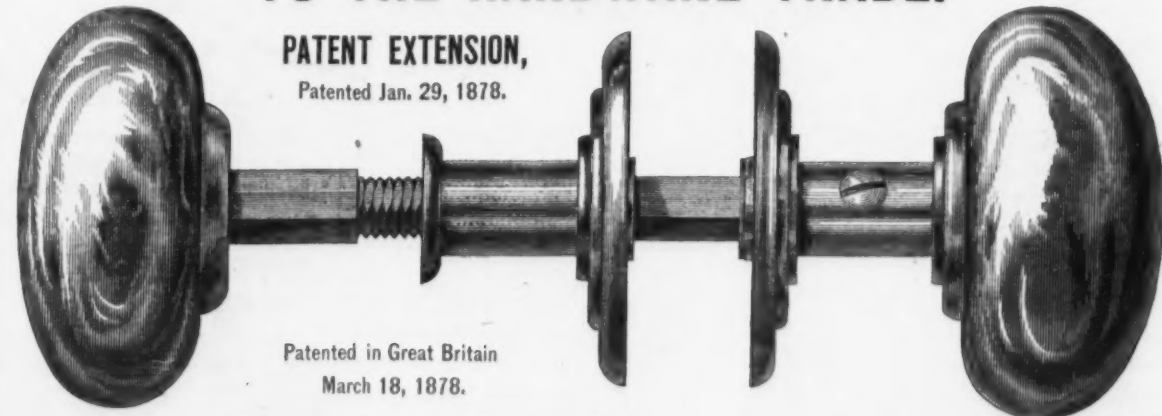
Please send full particulars regarding buildings or localities to be lighted, available power, &c.

Centennial Gold Medal American Institute, 1876. Medal of Superiority, American Institute, 1877.
Centennial Medal, Philadelphia, 1876. Paris Medal, 1878.

TO THE HARDWARE TRADE,

PATENT EXTENSION,

Patented Jan. 29, 1878.



Patented in Great Britain
March 18, 1878.

We desire to call your attention to our NEW

PATENT EXTENSION DOOR KNOBS.

These we manufacture in every variety of style.

Your especial attention is called to our "SILVER GLASS," and "ENAMELED" KNOBS, the latter being an entirely new article.

These we offer to the Trade, feeling confident of their superiority to any other door knobs in the market. Our new method of extension is simple, durable and perfect.

Our Knobs can be adjusted to doors of any thickness without the annoyance of the old-fashioned washers and pins.

We feel confident that a trial will make plain their merits.

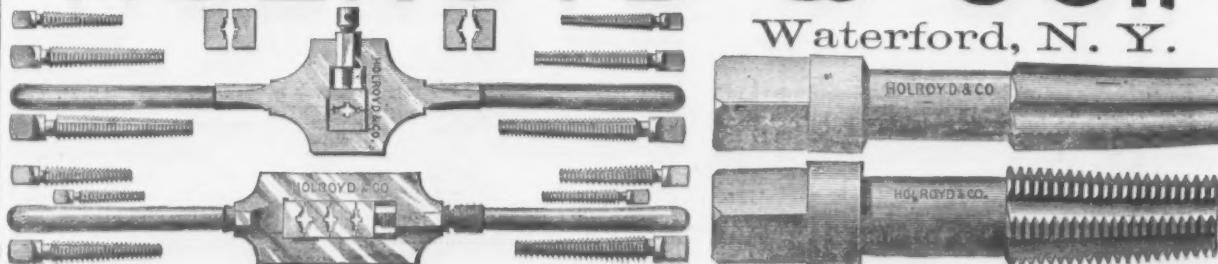
Very truly yours,

THE STAR SALT CASTER CO.,
BOSTON.



HOLROYD & CO.,

Waterford, N. Y.



McNab & Harlin Mfg. Co.,
MANUFACTURERS OF

BRASS COCKS AND VALVES,

For STEAM, WATER and GAS.

Iron Pipe and Fittings.
PLUMBERS' MATERIALS

New Illustrated Catalogue and Price List sent by express to the Trade on application.

Factory, Paterson, N. J. 56 John Street, N. Y.

STANDARD NUT CO.,
Pittsburgh, Pa.,
MANUFACTURERS OF

HOT PRESSED Square & Hexagon Nuts,

R. R. FISH BARS, BOLTS, SPIKES, RIVETS, &c.

The Allentown Foundry and Machine Shops.
Established in 1835.

Old reliable. Manufacture Steam Engines, Double Hoisting or Reversible Engines, Compound Engines, Boilers of any description, Power Pumps, Flange Pipes from 4 to 36 in. bore, Thomas' patented and Bradford's patent Ore Washeries, Mining Machinery, Blast Furnace Work, Hot Blast Castings, Turbine Wheels, Shafting and Pulleys.

More than half of the Engines and Mining Machinery used in mining ores in the Lehigh Iron District were built here. We have more experience in iron ore mining machinery than any other party in Pennsylvania, having most excellent facilities for doing all kinds of engineering work. Our shops are connected by a switch with competing lines in all directions. Parties needing anything in our line will do well to consult us.

W. H. BARBER & BRO., Allentown, Pa.

THE MACKENZIE PATENT CUPOLA & BLOWER.
Send for circular to
Smith & Sayre Mfg. Co.,
PROPRIETORS, 21 Cortlandt St., New York.

This Cupola has made a great revolution in melting iron. It differs from all others in having a continuous tuyere, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made oval in form. This brings the blast to the center of the furnace with the least resistance and smallest possible amount of power, and in combination with the continuous tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting ten or fifteen tons an hour with the pressure of blast required to melt two or three tons in an ordinary cupola. It also enables us to save very largely in time and fuel, the experience of our customers showing a gain of twenty-five to fifty per cent. in time, and necessitating a forty per cent. fuel over the ordinary cupola, and a better quality of casting, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting.

We manufacture these Cupolas of any desired capacity, numbered from 1 to 25, inclusive, the numbers indicating the melting capacities in tons per hour—No. 1, one ton; No. 2, two tons; No. 3, three tons per hour, and so on up to 25, or 30 tons. We have improved the construction of these Cupolas in every way, have increased their strength and durability, and sought to make them an convenient working and repairs as our own and the experience of our customers could suggest.

CUYAHOGA WORKS
MANUFACTURES

STEAM Hammers

LAND AND

Marine Engines,

BLAST FURNACE Machinery.

Send for Circulars.
Cleveland, Ohio, U. S. A.

NEW NEW sizes Patent Malleable Iron Oiler, Nos. 2 and 3.
pattern Heavy Screw Clamps; strongest in the market.
Send for Price List.

Malleable Iron Castings

of superior quality, and Hardware Specialties in Malleable Iron made to order.

HAMMER & CO., Branford, Conn.

THE "OLD RELIABLE"
UNIVERSAL Clothes Wringer.

Improved with Rowell's Double Cog-Wheels on both ends of each roll.
Over 500,000 sold!
And now in use, giving "Universal" satisfaction

EVERY WRINGER WARRANTED.
Be sure and inquire for the "Universal."
Sold by the Principal Jobbers in Hardware and House-Furnishing Goods everywhere.
Special rates given for export.

Metropolitan Washing Machine Co.
32 Cortlandt St., New York.

STEAM PUMPS, STEAM ENGINES, Air Compressors, HOISTING ENGINES.

The Norwalk Iron Works Co.,
SOUTH NORWALK, CONN.
PATENT NICKEL-SEATED
"POP" SAFETY VALVES

FOR STATIONARY, LOCOMOTIVE, MARINE, and PORTABLE STEAM BOILERS.

Our Patents cover all Safety Valves utilizing the recoil action of steam, and familiarly known as "Pop Safety Valve."

Purchasers, beware of infringements of our Patents.

Capital, \$100,000.

The Consolidated Safety Valve Co.,
Office and Manufactory,
51 & 53 SUDBURY ST., BOSTON, Mass.

STEAM PUMPS, STEAM ENGINES, Air Compressors, HOISTING ENGINES.

The Norwalk Iron Works Co.,
SOUTH NORWALK, CONN.
PATENT NICKEL-SEATED
"POP" SAFETY VALVES

FOR STATIONARY, LOCOMOTIVE, MARINE, and PORTABLE STEAM BOILERS.

Our Patents cover all Safety Valves utilizing the recoil action of steam, and familiarly known as "Pop Safety Valve."

Purchasers, beware of infringements of our Patents.

Capital, \$100,000.

The Consolidated Safety Valve Co.,
Office and Manufactory,
51 & 53 SUDBURY ST., BOSTON, Mass.

THE CONSOLIDATED SAFETY VALVE CO.,
Office and Manufactory,
51 & 53 SUDBURY ST., BOSTON, Mass.

R. D. WOOD & CO.
Philadelphia,
Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.
Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants.
400 CHESTNUT STREET.

WM. S. CARR & CO.
Sole Manufactory of
CARR'S PATENT Water Closets,
PUMPS, CABINET WOOD WORK, &c.
106, 108 & 110 Centre Street,
Factory, Mott Haven, N. Y.

P. BLAISDELL & CO.,
Manufacturers of

MACHINISTS' TOOLS,

Blaisdell's Patent Upright Drills,
With Quick Return Motion.
Engine Lathes, Planers, Boring Mills,
Gear Cutters and Hand Lathes.
WORCESTER, MASS., U. S. A.

THE CELEBRATED Holt Portable Forge.
All Styles and Sizes.

Gives Stronger Blast and Easier Operated than any other Portable Forge in the market.

MANUFACTURED BY
HOLT'S CLEVELAND GAUGE CO.,
Champlain St., Cleveland, O.

BOSTON.
Reported by Macomber, Bigelow & Donner, 156 to 164 Oliver St.

Avails.—Eagle American, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Apple Papers.—Reading Turn Table, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Goodell Turn Table.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Lighting.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Hudson's Turn Table and Push-off.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Alken's Tools.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Avail & Vice.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

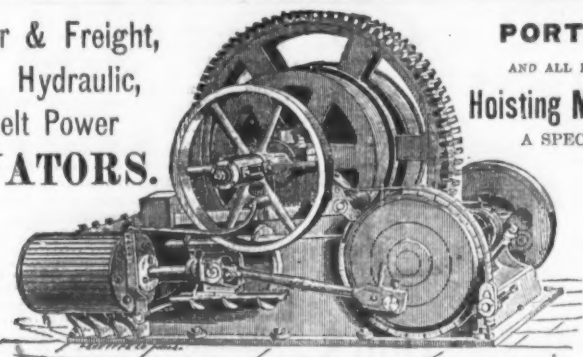
Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Augers & Bits.—No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61,

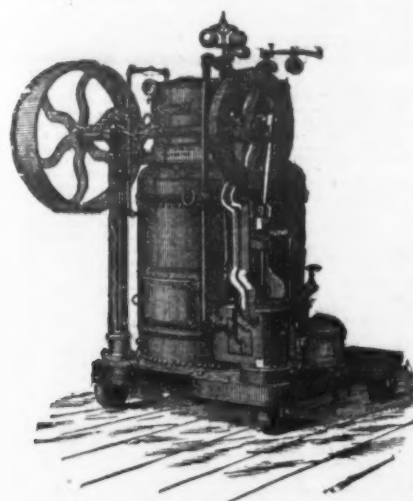
Passenger & Freight,
Steam, Hydraulic,
and Belt Power
ELEVATORS.



PORTABLE
AND ALL KINDS OF
Hoisting Machinery
A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.
STOKES & PARRISH, 3001 Chestnut St., Philadelphia.



SHAPLEY ENGINE.

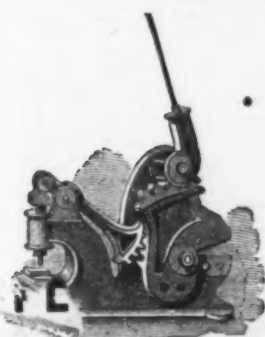
Patented Feb. 10, 1874.
Reissued June 22, 1875.
Compact, Practical, Durable and Economical.

MANUFACTURED BY
SHAPLEY & WELLS,
Binghamton Iron Works,
Binghamton, N. Y.
MANUFACTURERS OF
Stationary Engines and Boilers.

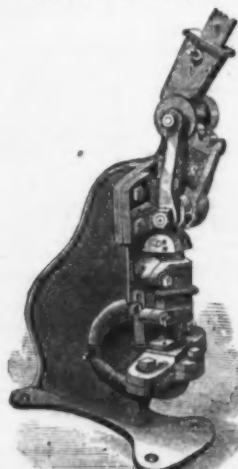
Also Machinery for Mills of all kinds and
Tanneries. Also their celebrated **Bark**
Mills, acknowledged to be the best.
Send for reduced price list circular.

E. LYON & CO.,

No. 470 Grand Street, New York.



Combination Punch and Shears.
Cuts Round and Flat Iron.



Punch 1/4 to 1/2 in., 1/4 in. Plates.



Shears for Plates and Bars

SOLE MANUFACTURER OF
Lyon's Patent Hand and Power
DRILLS, SHEARS AND PUNCHING PRESSES.
For Workers in Iron and Steel, adapted to all trades.
Send for circular and prices.



Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

988 to 954 River St. & 67 to 83 Vall Ave., Troy, N. Y.

VALVES.

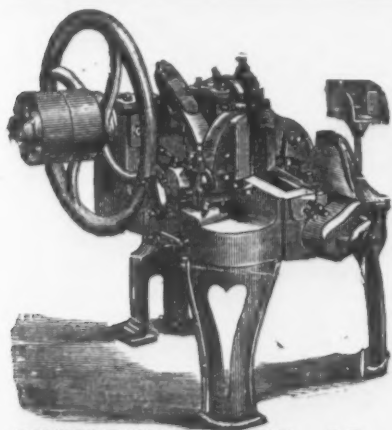
Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

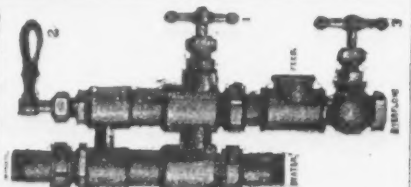
PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 30 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.



PITTSBURGH MFG. CO.

Manufacturers of Nail and Spike Machines, Bolts,
Rods, Washers, Rivets, &c. Castings, Forgings
and Blacksmith Work promptly attended to.

OFFICE & WORKS, Railroad St., near 28th, Pittsburgh, Pa.

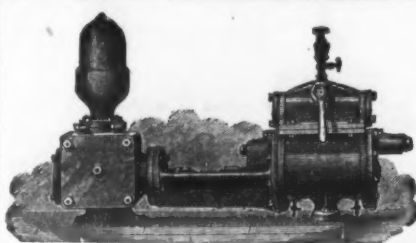


THE HANCOCK INSPIRATOR,

New Combined Pump and Injector.
Eclipses all other appliances hitherto introduced for
feeding Steam Boilers. A Portable Boiler is not per-
fect without one. It lifts its water 25 feet with a low
steam pressure, and puts it directly into the Boiler.
No adjustment necessary for varying steam pressure.
G. W. STORER, General Agent, 140 N. 3d St., Phila.

STEAM PUMPS

Manufactured by
Crane Bros. Mfg. Co.,
CHICAGO.



A. S. CAMERON'S PATENT

"SPECIAL" STEAM PUMP

Is the Standard of Excellence at Home and Abroad.

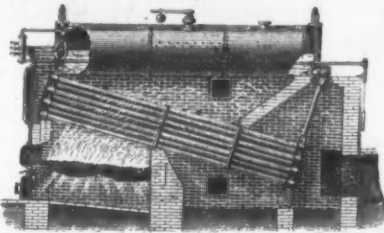
For reduced price lists address **A. S. CAMERON, East 23d Street, New York.**

Babcock & Wilcox Water-Tube Steam-Boiler

OVER 35,000 HORSE-POWER NOW IN USE. ADAPTED FOR ALL PURPOSES.

SAFETY FROM

In Sections Easy of Transportation.
No Bolted, Screwed or Packed Joints.
All Joints Made by Expanding Wrought
Iron Tubes into Bored Holes.
Can be Erected or Repaired by Ordinary
Mechanic.



EXPLOSIONS.

Easily Cleaned from Soot or Sediment.
Adapted to all kinds of Fuel.
Steady Water Line and Dry Steam.
No Leaks from Unequal Expansion.
Rapid Steaming.
Highest Attainable Economy.

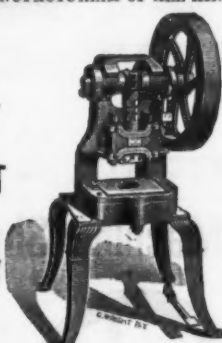
CENTENNIAL EXPOSITION MEDAL AWARDED THIS BOILER FOR HIGHEST ECONOMY AND EFFICIENCY ON TEST.
Illustrated Circulars and other desired information promptly furnished. **BABCOCK & WILCOX, Engineers, 30 Cortlandt St., N. Y.**

Bliss & Williams, PRESSES and DIES.

MANUFACTURERS OF ALL KINDS OF



Also Manufacturers of
SPECIAL MACHINERY
FOR
WORKING SHEET METALS, &c.
FRUIT & other CAN TOOLS.



Plymouth, Pearl and
John Streets,
BROOKLYN, N. Y.,
U. S. A.



PARIS EXPOSITION, 1878.



WM. COOKE,

(Successor to COOKE & BEGGS),

Agent for the

HOPE Vertical Engines,

AND A PATENT

STEAM TUBE CLEANER,

Working on an entirely new principle.

DEALER IN

Railway,
Steamship,
Manufacturers'

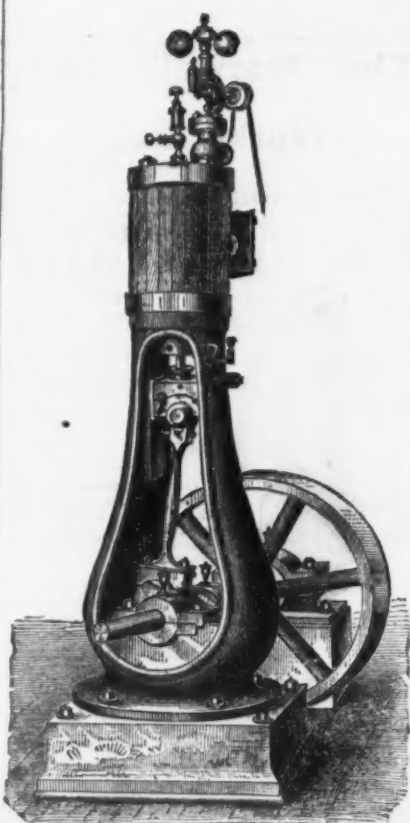
Mill and Miners'

SUPPLIES,

6 Cortlandt Street,

NEW YORK, N. Y.

Catalogue on application.

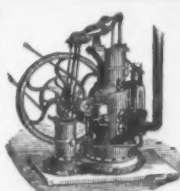


LANE & BODLEY CO.,

MANUFACTURERS OF

STEAM ENGINES, SAW MILLS AND MINING MACHINERY.

LANE & BODLEY COMPANY, Cincinnati, Ohio.

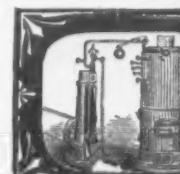


AIR ENGINES. NO WATER. NO ENGINEER.

No extra insurance! Absolutely safe! Simple! Reliable! Durable!
Most convenient and economical power known.

SHERILL ROPER AIR ENGINE CO.,

Manufacturers of Air Engines, Elevators and Hoisting Machinery
91 & 93 Washington Street, New York.



ORAM & ATHERTON
NEW AND SECOND HAND MACHINERY
STAVE MACHINERY A SPECIALTY
OFFICE & WORKS, 155-157 RIVER ST., CLEVELAND, O.

DEAD-STROKE POWER HAMMERS.

CONSTRUCTION IMPROVED.

Prices Reduced. Seven Sizes.
5 to 250 Pounds.



The 15 and 25 pound sizes are specially adapted for
filmmakers' use, the other sizes for general forging.
Send for circular and references.
DIENELT, EISENHARDT & CO.
MAKERS
1306, 1308, 1310 Howard St., Philadelphia, Pa.



THE PRATT & WHITNEY CO.,

Hartford, Conn., U. S. A.,

Make specialties of

DROP HAMMERS

Punching Presses, Hand Drilling Machines, Ratchet
Drills, Combination Lathe Chucks, Cutters for
Teeth of Gear Wheels, Screw Plates, Hand Ma-
chine, Nut and Pipe Taps, Bolt Cutters, &c., &c.

ROCK BREAKERS.

Blake's Patent Expired—End of Monopoly.
The undersigned, sole owners of the old Levi-
athan, Gates' patent, and the Brown's patent Rock
breakers, will guarantee our crushers to break
two tons to one of Blake's (or any other). Send
for circulars. Also Stamp Mills and all kinds of
Mining Machinery made on short notice.
Office, 59 Canal Street, Chicago, Ill.

GATES & SCOVILL IRON WORKS.

Shafting, Pulleys, Hangers, etc.,

a specialty. Send for Price List to

A. & F. BROWN,

57-61 Lewis St., New York.

Machinery, &c.

THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

Reduced Price List.

OCTOBER 15, 1878.

For dimensions of Governor, see Illustrated Price List.



THE JUDSON PATENT

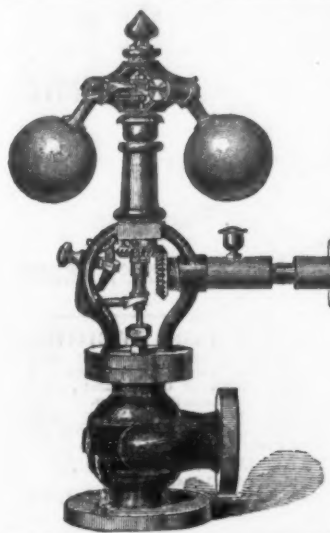
Improved Steam Governor.

No Charge for Boxing or Cartage.

JUNIOR JUDSON & SON, Rochester, N. Y.

THE SHIVE STEAM ENGINE GOVERNOR.

Reduced Price List, Nov. 1, 1879.

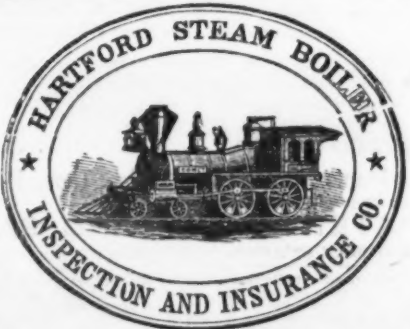


Size of Governor	Black	Fin-ished.	Ball and Lever.	Speed-er.	Auto-matic Safety Check.	Stop Valve.
3/4 in.	\$16.00	\$18.00	\$1.00	\$2.25	\$.....	\$4.00
1 in.	18.00	20.00	2.00	2.35	.....	5.00
1 1/4 in.	20.00	23.00	2.25	2.50	.....	6.00
1 1/2 in.	23.00	27.00	2.50	2.75	8.00	7.50
2 in.	27.00	31.00	2.75	2.75	9.00	9.00
2 1/2 in.	35.00	41.00	3.50	3.50	10.00	12.00
3 in.	45.00	52.00	4.25	4.25	11.00	17.00
3 1/2 in.	54.00	62.00	4.50	4.50	12.50	21.00
4 in.	64.00	73.00	5.00	5.00	14.50	25.00
4 1/2 in.	74.00	84.00	5.25	5.25	16.00	31.00
5 in.	84.00	95.00	6.00	6.50	17.50	37.00
5 1/2 in.	112.00	125.00	7.00	7.50	19.00	40.00
6 in.	132.00	146.00	8.00	9.50	22.00	60.00
7 in.	160.00	176.00	9.00	10.00	25.00	75.00

TO ALL WHO USE STEAM POWER.—We will put our Governor on any engine and warrant it to prove superior to all others, and to do all we claim for it. If, after a fair trial, it does not, we will take it off at our own expense. No charge for boxing. Manufactured by

M. C. SMYLLIE,

Office, 139 N. Third St., Philadelphia, Pa., U. S. A. Works, Bethlehem, Pa., U. S. A.



Issues Policies of Insurance after a careful inspection of the Boilers.

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery.

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS.

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

Board of Directors:

J. M. ALLEN, President. LUCIUS J. BENDER, Pres't of Fire Ins. Co. FRANK W. CHENEY, Ass't Treas. Cheney Brothers Silk Manufacturing Co. CHARLES M. BEACH, of Beach & Co. DANIEL PHILLIPS, of Adams Express Co. GEO. M. BARTHOLOMEW, Pres't Amer. Nat'l Bank. RICHARD W. H. JARVIS, Pres't Colt's Fire Arms Manufacturing Co. THOMAS O. ENDERS, Sec'y Aetna Life Ins. Co. LEVERETT BRAINARD, of Case, Lockwood & Brainard. GEN. WM. R. FRANKLIN, Vice Pres't Colt's Pat. Fire Arms Mfg. Co. GEO. CROMPTON, Crompton Loom Works, Worcester WILLIAM ADAMS, of Baeder, Adams & Co., Philadelphia. HON. THOS. TALBOT, Ex-Governor of Mass. NEWTON CASE, Case, Lockwood & Brainard, Hartford WILLIAM S. SLATER, Cotton Manufacturer, Providence, R. I. NELSON HOLMIST, of State Bank, Hartford. D. H. SMITH, Pres't Springfield Fire & Marine Ins. Co.

A. H. MERRIMAN,

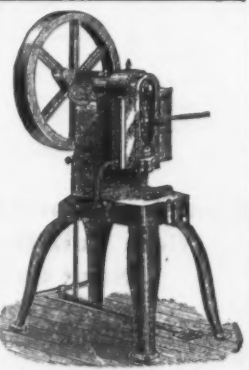
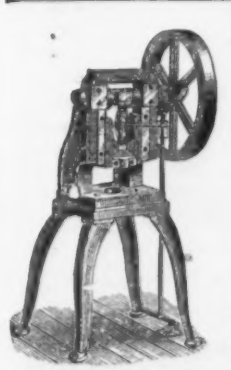
Patent Power

PUNCHING

PRESSES.

WEST MERIDEN, CONNECTICUT.

Judges' Report.—"He exhibits a power press, or punch, which is a well-made, substantial machine, and contains several features of marked originality, which materially augment its durability and efficiency."



ASTONISHING POWER in FOOT and HAND PRESSES.

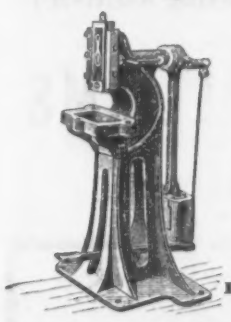
Punching, by foot, 3-4 hole in 5-16 iron 6 inches from edge.

Smaller sizes punch, by foot, 3-8 x 1-4, and 1 inch by 1-8, as rapidly as by power presses, at one-half the cost.

Our largest hand machines punch 1 inch hole in 3-8 iron, and shear bar 3-4 x 2 inches at a cut, any length, one man at the lever.

Highest prize, The Grand Medal of Progress, has just been awarded us at the American Institute Exhibition. Our presses can also be run by steam power.

PEERLESS PUNCH and SHEAR CO., 52 Dey Street, New York City.



LOVEGROVE & CO., PHILADELPHIA, PA.,

MANUFACTURERS OF

BOILERS & ENGINES, ALL SIZES.

1-HORSE ENGINE AND BOILER, \$175; 2-HORSE, \$275; 3-HORSE, \$375; 4-HORSE, \$475; 5-HORSE, \$575; 6-HORSE, \$675; 8-HORSE, \$875; 10-HORSE, \$1,075.

WARRANTED THE BEST. SEND FOR CIRCULAR.

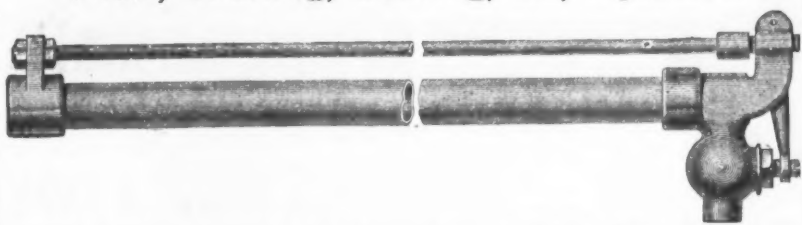


Machinery, &c.

WILLIAM SELLERS & CO., PHILADELPHIA,

MANUFACTURERS OF

Iron and Steel Working Machinery, Machinists' Tools, Shafting, Gearing, &c., Injectors.



MULTIPLIED MOTION STEAM TRAP.

Suits any Location.

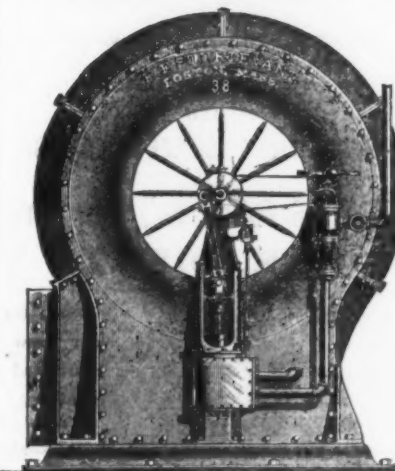
Price, \$12.

Send for circular giving particulars.

Branch Office, 79 Liberty Street, N. Y.

STURTEVANT

BLOWERS & EXHAUST FANS



Sturtevant Patent Steam Fan.

suits with minimum power. Used in the largest establishments in the country, where the strongest blast is required.

Sturtevant Patent Improved Fan Blower,

For Steam Boilers, Puddling and Heating Furnaces.

Send for Illustrated Catalogue to

B. F. STURTEVANT, Patentee and Sole Manufacturer, 72 Sudbury Street, Boston, Mass.

Sturtevant's Patent Steam Fan,

For Blowing Furnaces of all kinds, such as are provided with grate bars; especially adapted for Steam Boilers, Puddling and Heating Furnaces. Coal Screenings and all kinds of refuse coal may be successfully used for fuel by the use of these Fans to create blast. For forcing fresh air into, or taking foul air out from Coal Mines and other places needing ventilation, such as Hospitals, Asylums, Theaters and other Public Buildings, Manufacturing Establishments, &c. Also for numerous other uses where large volume of air is required.

Sturtevant Patent Exhaust Fan,

For removing Shavings and Dust from Wood-Working Machines, Dust from Sand and Emery Wheels, and for Ventilation.

Sturtevant Steel Pressure Blower,

For Cupola Furnaces and Forges. The Blower, which exceeds all others, produces maximum results.

PRESSES, DROP HAMMERS, DIES, And Other Tools

FOR THE MANUFACTURE OF ALL KINDS OF

SHEET METAL GOODS,

Drop Forgings, &c.

THE STILES & PARKER PRESS CO., Middletown, Conn.

NEW OTTO SILENT GAS ENGINE.

Working Without Boiler, Steam, Coal, Ashes or Attendance.

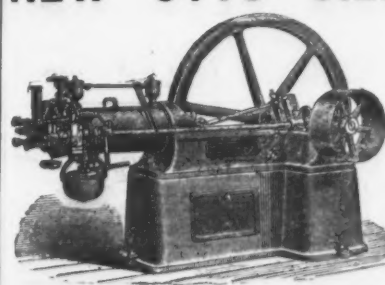
Started Instantly by a Match, it gives Full Power Immediately.

When Stopped, all Expense Ceases.

No explosions, no fires nor cinders, no gauges, no pumps, no engineer or other attendant while running. Recommended by insurance companies.

UNSURPASSED IN EVERY RESPECT for hoisting in warehouses, printing, ventilating, running small shops, &c.

2, 4 and 7 H. P. and upwards. Built by SCHLEICHER, SCHUMM & CO., Engineers and Machinists, 3045 Chestnut Street, Philadelphia.



BEECHER & PECK,

Successors to Milo Peck, Manufacturers of



11 Regular Sizes. Hammers from 50 lb. to 250 lb. WE HAVE A LARGE STOCK OF SPECIAL DROP PATTERNS.

Special attention given to the making of all Drop Dies. Special machinery fitted up to order.

Send for Price List.

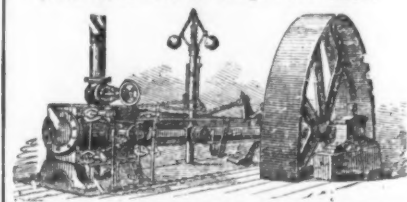
New Haven, Conn.



Machinery, &c.

Corliss Engine Builders,

With Wetherill's Improvements.



Engineers, Machinists, Iron Founders and Boiler Makers.

ROBT. WETHERILL & CO. Chester, Pa.

Box's Patent Portable Double Screw Hoist.

With New Patent Self-Adjusting Chain Guide.

FIRST PREMIUM WHEREVER EXHIBITED.

Philadelphia, 1879; St. Louis, 1879.



Always Reliable. Is stronger, better made, will lift more, raises faster, works easier, and lasts longer than any other hoist in existence. Can be used in any position, even in verted. Single lifting chain that cannot slip, or leave the wheel when moving from place to place. Chain guide that will allow the operator to pull at angle of 45 degrees, and yet keep the same quantity of chain at all times on the wheel.

The Perfection of Hoisting Machines.

Manufactured in sizes from 500 lbs. to 20 tons.

Send for circular.

ALFRED BOX & CO.,

Northern Liberty Works, 312 & 314 Green Street, Philadelphia, Pa.

Also, Box's Patent Radial Drills, full line of Machinists' Tools, Drills, Engines, Shafting, Hangers, Pulleys, Hoists, Elevators, &c.

Established 1867.

Edwin Harrington & Son

MANUFACTURERS OF PATENT EXTENSION, SCREW CUTTING, GAP AND TERRET

LATHES,

Iron Planers, BORING MILLS,

Radial, Upright, Suspension Multiple, Lever, Carriage

Makers' Blacksmiths' Hand and Power

DRILLS,

and a variety of other MACHINISTS' Tools.

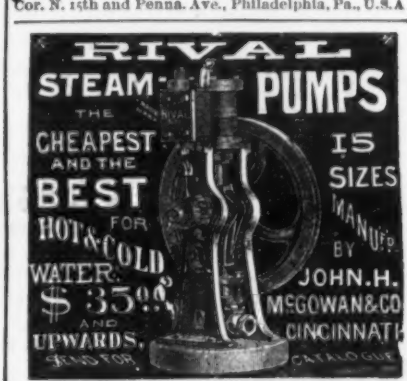
Patent Double Chain Pulley Blocks,

unrivalled for Durability, Safety and Power.

Patent Double Chain Quick-Lift Hoists,

with Brake for quick and easy lowering.

Circulars furnished. WORKS AND OFFICE, Cor. N. 15th and Penna. Ave., Philadelphia, Pa., U.S.A.



RIVAL STEAM PUMPS

THE CHEAPEST AND THE BEST

HOT & COLD WATER.

\$35.00 UPWARDS.

IS SIZES BY JOHN H. MCGOWAN & CO. CINCINNATI

Manufacturers of

Mill and Lathes, Planers, Carriage Makers' Tools, and all other machinery in all its branches.

139-143 CENTRE STREET, CORNELL'S BUILDING, NEW YORK.

Send for Illustrated Catalogue.

Boylnton & Plummer, Manufacturers of Improved Patent Drills,

Adapted to Blacksmiths' and Carriage Makers' use.

Bolt Cutters and Tire Benders.

From New and Improved Patterns. Also,

Hand and Power Shapers,

54 Hermon Street, WORCESTER, MASS.

Boylnton & Plummer, Manufacturers of Improved Patent Drills,

Adapted to Blacksmiths' and Carriage Makers' use.

Bolt Cutters and Tire Benders.

From New and Improved Patterns. Also,

Hand and Power Shapers,

54 Hermon Street, WORCESTER, MASS.

Boylnton & Plummer, Manufacturers of Improved Patent Drills,

Adapted to Blacksmiths' and Carriage Makers' use.

Bolt Cutters and Tire Benders.

From New and Improved Patterns. Also,

Hand and Power Shapers,

54 Hermon Street, WORCESTER, MASS.

Boylnton & Plummer, Manufacturers of Improved Patent Drills,

Adapted to Blacksmiths' and Carriage Makers' use.

Bolt Cutters and Tire Benders.

From New and Improved Patterns. Also,

Hand and Power Shapers,

54 Hermon Street, WORCESTER, MASS.

TUBAL SMELTING WORKS.

760 South Broad Street, PHILADELPHIA.

PAUL S. REEVES,

MANUFACTURER OF

ANTI-FRICTION METALS.CAR & MACHINERY BRASSES, INCOB BRASS
AND SOLDER, WHITE BRASS.

Old Metals and Brass Turnings Wanted.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,
PHILADELPHIA,

P. O. Address: Frankford, Philad'a. } MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform AND C Springs,**"Brewster Side Bar Combination
Patented" Springs.**

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.
CAST SHOVEL, HOE AND MACHINERY STEEL.

OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.

BESSEMER SHOVEL AND PLOW STEEL.

BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.

NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

RANCIS B. GRIFFIN.

CHARLES E. JENNINGS.

C. E. JENNINGS & CO.,

98 Chambers St., New York.

Sole Agents for L'HOMMEDIEU and WATROUS & CO., Ship Augers and Bridge Builders' Augers; E. H. TRACY, Scotch Pattern and Railroad Augers; NOBLES MFG. CO., Carpenters' Augers, Bits and Drawing Knives; WHIGGLESWORTH SHEAR CO., GEO. S. WILDER, Merrill's Chisels and Drawing Knives; CONN. VALLEY HARDWARE CO., Soda Head Bits; NEWCOMB BROS., Hand, Moulders' and Blacksmiths' Bellows. Agents for H. H. MAYHEW & CO., Sheppardson's Bits; BENJAMIN PIERCE, Auger Bits; PHILLIPS MFG. CO., Boring Machines; C. L. JEFFORDS, Axes and Hatchets; BARBER'S Patent Countersinks; BONNEY'S Hollow Augers; L. D. FROST'S Philadelphia Carriage Bolts; Riverside Fork Mills.



This Cut is a full size illustration of the Patent Solid Head Auger Bit. 8-16

This bit has no equal for boring hard wood. In cross grain, knots, and the end of the wood its great superiority over any other is strongly marked. The solid head guarantees a perfectly straight hole.

C. E. JENNINGS & CO., Sole Agents.

ANTI-TARNISH SILVER TISSUE PAPERResists Action of Gases,
Keeps Silver Plate and
Other Metals Always Bright,
Except Iron and Steel.

SOLE MANUFACTURERS,

H. V. BUTLER, Jr., & CO., 34 Reade St., N. Y.**PETER GERLACH & CO.,**

MANUFACTURERS OF

Superior Cast Steel Saws

OF ALL DESCRIPTIONS.

Ice Tools, Butchers' Meat Rockers and the Standard Steel Flue Scrapers.

ALSO, MANUFACTURERS OF

STRAIGHT AND BILGING CYLINDER STAVE SAWING MACHINERY,

For all kinds of

Pail, Tub, Keg, Half Barrel, Barrel, Shook and Pipe Staves.

51 Centre Street, CLEVELAND, OHIO.

**J. M. CARPENTER**

PAWTUCKET, R.I.

Manufacturer of **TAPS AND DIES** of every description.Also, for sale low, **UNITED STATES STANDARD GAUGES**, from 1/4 to 3 inch.**IMPROVED STEEL CASTINGS.**

Under Hainsworth's Patents.

We make Castings practically free from blow-holes, of steel which is as soft and as easily WORKED and WELDED as Wrought Iron, yet is STIFF, STRONG and DURABLE, with a TENSILE STRENGTH of not less than 65,000 lbs. to the square inch. In short, our CASTINGS UNITE THE QUALITIES OF STEEL AND WROUGHT IRON.

Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions Railroad Frogs and Crossings, Flowshears, Moldboards and Landsides.

WE USE NO CAST IRON.

Send for circular.

PITTSBURGH STEEL CASTING CO.,
PITTSBURGH, PA.**Merrill Brothers,**
26 First St., Brooklyn, N. Y.

Successors to

C. Merrill & Sons.The Reading
Bolt & Nut Works.**DROP**HAMMERS,
FORGINGS and
POWER PRESSES.The Reading
Bolt & Nut Works. **J. H. Sternbergh,** Reading, Pa., U. S. A.

Manufacturer of a Superior Quality of

MACHINE BOLTS, HOT PRESSED NUTS,Railroad Track Bolts, Boiler and Bridge Rivets, Bolt Ends, Washers, Wood
Screws, Turnbuckles, Refined Bar Iron, Etc., Etc., Etc.**STANLEY G. FLAGG & CO.**

PHILADELPHIA, PA.

Office and Warehouse,

No. 216 & 218 N. THIRD ST.

Manufacturers of

STEEL CASTINGS.A Substitute for Steel and Wrought Forgings.
137 Circulars sent on application.**Steel Castings,**Light and heavy Steel Castings of superior
metal, solid and homogeneous. All work guar-
anteed. Send for circular.**EUREKA CAST STEEL CO.,**

Chester, Pa.

Office: 307 Walnut St., Phila.

IF YOU WANT A BABY

OR

Racket Lanternthat beats the world, you can find it, to-
gether with**TUBULAR, DIAMOND,**

No. 74, No. 76,

POLICE, FARM LANTERNS,

AND

Tubular Street, Square
and Side Lamps,
Square Station Lamps,

CORPORATION

AND

NEW YORK STREET LAMPS,

AT

54 & 56 Fulton St., New York.**R. E. DIETZ.**

Machines

at

Reduced

Prices,

and

Wheels

Guaranteed.



Send for

our new

illustrated

catalogue.

Weasport,

Pa.

ELECTRIC LIGHTS

From 1500 to 50,000 Candle

Power, for from \$100

to \$500.

EXCLUSIVE OF MOTIVE POWER.

Samples at 25 Beekman

Street, New York.

J. E. BRAUNSDORF & CO.,

Pearl River, Rockland Co., N. Y.

TACKLE BLOCKS.

Rope and Iron Strap of all kinds. Lig-

numvitas Wood for Ten-Pin Balls.

Wm. H. McMillan & Bro.,

Office, 113 South Street, New York.

Factory, 39 to 40 Penn St., Brooklyn, N. Y.

COLUMBIA BICYCLE.One can outdo the best horse,
100 miles in 7 hours, 1404 miles in
6 days. Send 3-cent stamp for
price list and 24 page catalogue
with full information.**THE POPE MFG. CO.**

65 Summer St., Boston.

Agents wanted in every city
who will open bicycle schools.

The Patent Combined

Dinner-Pail and**Lantern.**The most perfect Dinner Pail
in the world. Hot coffee for
dinner and a Lantern at night.

Manufactured by JES. HAIGHT,

PORT CHESTER, N. Y.

Sent by express on receipt of

\$1.00. Special attention given
to export orders. Travelling
Agents Wanted.

THE ONLY PERFECT

PORTABLE & HAND**BLOWER MADE****MFG. BY****BUFFALO FORGE CO.**

BUFFALO, N. Y.

SEND FOR CIRCULAR & PRICE LIST.

AIR COMPRESSORS.

PRICES REDUCED. SEND FOR NEW CATALOGUE.

CLAYTON STEAM PUMP WORKS.

14 AND 16 WATER STREET, BROOKLYN, N. Y.

Scranton Brass Works,**J. M. EVERHART,**

Manufacturer of

BRASS WORK,

For Water, Gas & Steam. Also

Carr & Wilcox's Patent Cut Files.

Will cut faster, wear longer, and clog

less than any File in the market.

CHIEF STREET, SCRANTON, PA.

MORGAN & CO., Agents, 99 John St., New York City.

Russell, Burdsall & Ward,

PORT CHESTER, N. Y.,

MANUFACTURERS OF

Carriage, Tire, Plow, Stove and Other

BOLTS,

CARRIAGE BOLTS MADE FROM BEST SQUARE IRON A SPECIALTY.

JOHN RUSSELL CUTLERY CO.,

Green River Works,

MANUFACTURERS OF

Table and Pocket Cutlery,

BUTCHERS', HUNTERS', PAINTERS', DRUGGISTS' & HOUSEHOLD KNIVES

IN ALL STYLES AND VARIETIES.

FIRST HOME MANUFACTURERS.

New York Office,

90 Chambers Street.

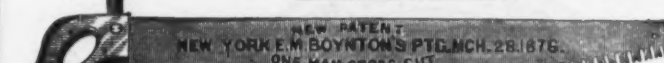


Factories,

Turners Falls, Mass.

**STEEL
CASTINGS**FROM 1-4 TO 10,000 LBS. WEIGHT,
True to pattern, sound and solid, of unequalled strength, tough-
ness and durability. An invaluable substitute for forgings or cast
iron requiring three-fold strength. Gearing of all kinds, Shoes,
Dies, Hammerheads, Crossheads for Locomotives, etc. 12,000
crank Shafts of this steel now running proved superior to wrought
iron. CRANK SHAFTS, CROSSHEADS AND GEARING ARE
SPECIALTIES. Circulars and Price Lists free. Address
CHESTER STEEL CASTINGS CO.,
(Formerly McHaffie Direct Steel Castings Co.)
Works, Chester, Pa. 407 Library st., Philadelphia.**E. M. BOYNTON,**

Manufacturer of all kinds of



First-Class Saws, Saw Frames, Cross-Cut Handles, Tools, Files, &c.

Also sole Proprietor and Manufacturer of the

GENUINE PATENT LIGHTNING SAW.

80 BECKMAN STREET, NEW YORK.

"Boynton's Saws were effectively tested before the judges at the Phila-
delphia Fair, July 24th and 25th. An ash log, 11 inches in diameter, was sawed
off, with a 4 1/2 foot lightning cross-cut, by two men, in precisely 6 seconds, at
time, by the chairman of the Centennial Judges of Class Fifteen. The speed
is unprecedented, and would cut a cord of wood in 4 minutes. The repre-
sentatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England,
and several other countries, were present, and expressed their high appre-
ciation." Received Medal and Highest Award of Centennial World's Fair,
1876. \$500 challenge was prominently displayed for six months, and the
numerous saw manufacturers of the world dared not accept it, or test in a
competition so hopeless.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.

Pat. Saw Set.

Pat. Cant File.